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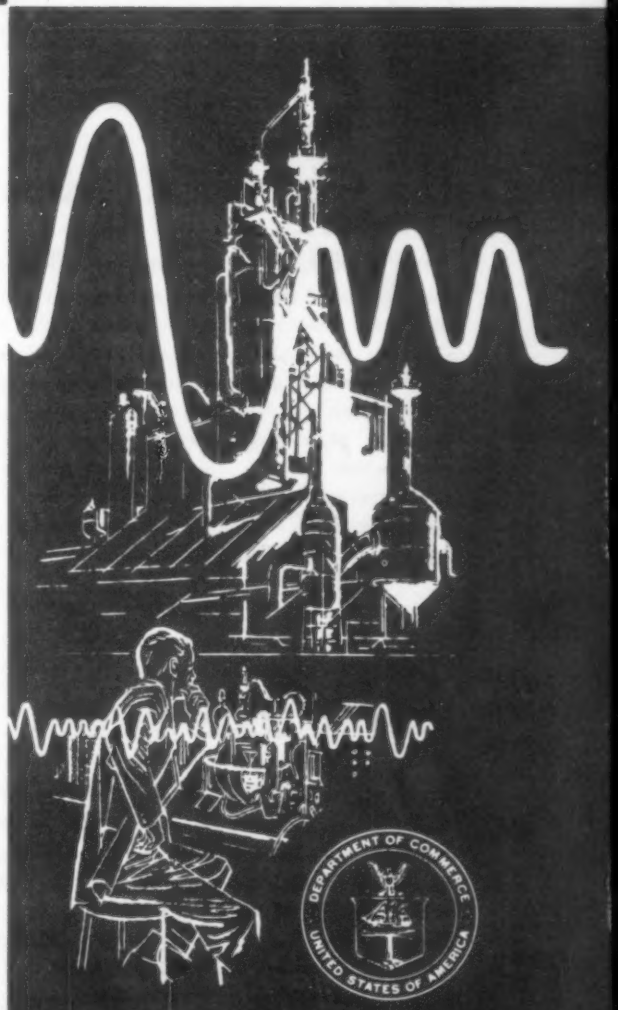

U. S. DEPARTMENT OF COMMERCE
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U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
John C. Green, *Director*

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*COUPLING CIRCUITS

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INVESTIGATION OF SOLID ELECTROLYTE FUEL CELLS FEASIBILITY OF THESE CELLS FOR AEROSPACE APPLICATIONS; (ZRO2) (CAO) ELECTROLYTE MATERIAL WAS CHOSEN FOR THE PROTOTYPE; A TAPERED TUBE SEGMENT WAS CHOSEN IN PREFERENCE TO FLAT DISKS FOR THE ELECTROLYTE SHAPE.
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*ELECTRIC ARCS

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*ELECTRIC DISCHARGES

EFFECTS OF INTRAMATERIAL CORONA ON VARIOUS INSULATING MATERIALS.
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*ELECTRIC INSULATION

EFFECTS OF INTRAMATERIAL CORONA ON VARIOUS INSULATING MATERIALS.
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*ELECTRIC POWER PRODUCTION

SOME SULFIDES, SELENIDES, AND TELLURIDES OF U AND TH WERE EVALUATED AS POTENTIAL HIGH TEMPERATURE THERMOELECTRIC MATERIALS. SYNTHESIS, THERMOELECTRICITY, AND THERMOELECTRIC POWER PRODUCTION.
AD-277 002 DIV. 25

*ELECTRICAL NETWORKS

TRANSISTOR BANDPASS AMPLIFIERS OF WELL-DEFINED PERFORMANCE. BASIC STABILITY AND GAIN CONSIDERATIONS. ACTIVE TWO-PORT NETWORKS WITH LARGE MISMATCH. PADDING WITH LOSS ELEMENTS. CASCADED ACTIVE TWO-PORT NETWORKS. PRACTICAL DESIGN EXAMPLES.
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*ELECTROACOUSTIC TRANSDUCERS

PIEZOELECTRIC ELECTROACOUSTIC ENERGY CONVERTER WHICH WILL CONVERT ENERGY IN AN ACOUSTIC FIELD ON THE ORDER OF 173 DB. THE ELECTRICAL OUTPUT MUST BE NOMINALLY 100 VDC. A SCHEMATIC REPRESENTATION IS DERIVED AND ANALYZED.
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*ELECTROCARDIOGRAPHY

AN INVESTIGATION TO DEMONSTRATE THAT SOME SIGNAL THEORY CONCEPTS ARE APPLICABLE TO AND GREATLY FACILITATE IN THE DIAGNOSIS OF ELECTROCARDIOGRAMS.
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*ELECTROCHEMISTRY

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*ELECTRODES

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*ELECTROLYTIC CELLS

MERCURY CELL BATTERY STUDIES OBJECTIVE OF THIS PROGRAM IS TO PROVIDE DESIGN CRITERIA FOR LONG LIFE, LIGHT-WEIGHT SECONDARY BATTERIES FOR MILITARY AEROSPACE APPLICATION THROUGH INVESTIGATION OF THE ZN/KOH/HG O-AU ELECTROCHEMICAL SYSTEM.
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DEPOLARIZERS FOR HIGH ENERGY DENSITY THERMAL BATTERIES. CUO AND SB2O3. POLARIZATION CURVES AND EXPERIMENTAL CELL DISCHARGE INDICATED THERMAL CELLS WITH THESE DEPOLARIZERS MAY BE SUITABLE FOR A BATTERY OPERATING 5 MIN AT 10 KW WITH ENERGY DENSITY OF 100 WATT-HRS/LB.
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*ELECTROMAGNETIC WAVES

RESEARCH CONDUCTED BY THE MICROWAVE RESEARCH INSTITUTE, IN THE FOLLOWING AREAS, IS PRESENTED: ELECTROMAGNETICS, PLASMA ELECTROPHYSICS AND ELECTRONICS, SOLID STATE AND MATERIALS RESEARCH, MICROWAVE CIRCUITS, NETWORK THEORY, SYSTEMS AND CONTROLS.
AD-277 038 DIV. 8

DISCUSSES THE FORMULATION OF ELECTROMAGNETIC RADIATION AND DIFFRACTION PROBLEMS IN ANISOTROPIC AREAS.
AD-277 039 DIV. 8

HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE. THE DEVELOPMENT OF TECHNIQUES TO DETECT AND DETERMINE THE EFFECTS OF HEAT ON SELECTED PRIMARY EXPLOSIVES.
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THE DEVELOPMENT OF TECHNIQUES TO DETECT AND DETERMINE THE EFFECTS OF HEAT ON SELECTED PRIMARY EXPLOSIVES.
AD-277 434 DIV. 22

*ELECTROMAGNETS

A SELECTION OF ARTICLES ABOUT SOLID STATE RESEARCH DEVICE DESIGN.
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*ELECTRON TRANSITIONS

A METHOD FOR CALCULATING VIBRATIONAL TRANSITION PROBABILITIES USING THE WAVE FUNCTION EXPANSION TECHNIQUE OF TRISCHKA AND SAHEN.
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*ELECTRON TUBES

DESIGN AND DEVELOPMENT OF A SMALL CERAMIC-METAL ENVELOPE MEDIUM MU TRIODE OF CONCENTRIC CYLINDRICAL CANTILEVER CONSTRUCTION SUITABLE FOR RADIO-FREQUENCY AMPLIFIER APPLICATIONS.
AD-277 044 DIV. 8

DEVELOPMENT OF NEEDLE-SHAPED FIELD EMISSION CATHODES IN HIGH VACUUM SWITCH TUBES FOR RADAR PULSER APPLICATIONS.
AD-277 172 DIV. 8

TWENTY-FOUR MATCH-BOX TUBES WERE PROCESSED AND SAMPLES WERE SUBJECTED TO LIFE TESTS, RADIATION RESISTANCE, THERMAL SHOCK, NUCLEAR RADIATION, VIBRATION, FATIGUE, AND SHOCK. TEST RESULTS ARE GIVEN.
AD-277 227 DIV. 8

PROGRESS REPORT ON DESIGN OF CERAMIC-METAL SEALS FOR HIGH POWER TUBES. MANUFACTURING METHODS, PROCESSING, DESIGN, RELIABILITY STUDIES.
AD-277 427 DIV. 8

*ELECTRONIC CIRCUITS

THE LARGE AREA PN JUNCTION AS A PASSIVE, DISTRIBUTED, 3-TERMINAL DEVICE.
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AN AUTOMATIC MAP COMPILATION SYSTEM IS DESCRIBED. THE SYSTEM UTILIZES A SMALL DIGITAL COMPUTER WHICH DIRECTS AN ANALOG SYSTEM TO THE INDICATED HOMOLOGOUS POINTS FOR AN ESTIMATED HEIGHT ON A STEREO DIAPOSITIVE PAIR.
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THE PROPERTIES OF RING-PLANE SLOW-WAVE CIRCUITS FOR USE WITH HIGH-PERVEANCE BEAMS IN TRAVELING-WAVE TUBES CAPABLE EVENTUALLY OF OPERATING ABOVE 35 KMC WITH A 10% MINIMUM BANDWIDTH WITH EVENTUAL EFFICIENCIES GREATER THAN 10%.
AD-277 485 DIV. 8

*ELECTRONIC EQUIPMENT

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*ELECTRONIC SWITCHES

DEVELOPMENT OF NEEDLE-SHAPED FIELD EMISSION CATHODES IN HIGH VACUUM SWITCH TUBES FOR RADAR PULSER APPLICATIONS.
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*ELECTROSTATIC FIELDS

INVESTIGATION OF MAGNETIC AND ELECTRIC FORCES FOR ROTATING SHAFT SUSPENSION.
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*EQUATIONS OF STATE

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*ETHANOLS

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*ETHYLENES

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CHEMICAL REACTIONS BETWEEN SOLID PROPELLANT COMBUSTION GASES AND REFRACTORY METAL ALLOYS OF INTEREST FOR ROCKET MOTOR NOZZLES. W; TA, AND W-TA ALLOYS; PHYSICAL AND MICROSTRUCTURAL CHANGES.
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*EXPANDED PLASTICS

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*EXPLOSIVES

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THE DEVELOPMENT OF TECHNIQUES TO DETECT AND DETERMINE THE EFFECTS OF HEAT ON SELECTED PRIMARY EXPLOSIVES.
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***FATIGUE (MECHANICS)**

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***NUCLEAR EXPLOSIONS**

A TECHNIQUE IS PRESENTED FOR THE PREDICTION OF THERMAL INPUTS TO TARGETS FROM NUCLEAR WEAPONS. THE GEOGRAPHICAL FACTORS INFLUENCING THE TRANSMISSION OF RADIATION THROUGH CLOUDLESS ATMOSPHERE ARE STUDIED.
AD-277 008 DIV. 2

A THEORY FOR CALCULATING THE RESPONSE OF A SHOCK-ISOLATED BURIED CYLINDER TO BLAST LOADS IS PRESENTED. A METHOD FOR HARDENING A BURIED SHELTER BY INTERPOSING A CUSHIONING MATERIAL BETWEEN THE SOIL AND THE SHELTER IS PROPOSED.
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A THEORETICAL AND EXPERIMENTAL STUDY WAS UNDERTAKEN OF HARMONIC GENERATION IN FERRITES WITH PARTICULAR EMPHASIS ON THE SECOND HARMONIC VARIATION OF THE Z-COMPONENT OF MAGNETIZATION.
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CARD FORMAT MANUAL; AIR BATTLE MODEL II AND PLAN CONVERTER IA; SIMULATION OF AERIAL WARFARE.
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USERS AND OPERATORS MANUAL; ATTRITION DAMAGE ASSESSMENT MODEL III; A SUBSET OF AIR BATTLE MODEL II SIMULATION OF AERIAL WARFARE.
AD-277 236 DIV. 18

USERS AND OPERATORS MANUAL; AIR BATTLE MODEL II AERIAL WARFARE SIMULATION.
AD-277 237 DIV. 18

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AD-277 238 DIV. 18

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***OPTICAL SYSTEMS**

AN AUTOMATIC MAP COMPILATION SYSTEM IS DESCRIBED. THE SYSTEM UTILIZES A SMALL DIGITAL COMPUTER WHICH DIRECTS AN ANALOG SYSTEM TO THE INDICATED HOMOLOGOUS POINTS FOR AN ESTIMATED HEIGHT ON A STEREO DIAPOSITIVE PAIR.
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***ORBITAL FLIGHT PATHS**

A DISCUSSION IS PRESENTED COMPARING ASTRONOMICAL DIFFERENTIAL CORRECTION METHODS WITH THE BALLISTIC ANJOINT METHOD OF CORRECTING AN APPROXIMATE ORBIT.
AD-277 336 DIV. 12

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AD-277 357 DIV. 2

***ORGANIC COMPOUNDS**

ORGANIC SEMICONDUCTORS; SYNTHESIS; PURIFICATION AND SINGLE CRYSTAL GROWTH OF CORONENE, PERYLENE/IODINE COMPLEX, AND CHLORANIL-DURENEDIAMINE COMPLEX. SEMICONDUCTOR POLYMERS 2;4;6-TRICYANO-S-TRIAZINE AND TEREPHTALONITRILE WERE PREPARED.
AD-277 496 DIV. 4

***OXIDATION**

SELECTIVE OXIDATION OF BINARY MO ALLOYS CONTAINING 0.026 AT-% YT AND 0.056 AT-% HF FROM 1000 TO 1580 C. FORMATION OF PROTECTIVE COATINGS OF Y2O3 AND HFO2 BY INTERNAL OXIDATION.
AD-277 388 DIV. 17

***OXYFLUORIDES**

PROPULSION RESEARCH; FLUORIDE INVESTIGATIONS. EXPERIMENTS WERE CONDUCTED TO PROVE THE EXISTENCE OF THE MODEL COMPOUND, R4N( )SF5(-), BY REACTION OF SF4 WITH R4N( )F(-). PRELIMINARY FLUORINATION OF AN ORGANIC NITROSO COMPOUND WAS PERFORMED. A LITERATURE SEARCH WAS MADE.
AD-277 461 DIV. 4

***OXYGEN**

CATHODIC REDUCTION OF O AND H2O2 ON PT, PD AND IR SMOOTH ELECTRODES. POLARIZATION CURVES IN ACID, NEUTRAL AND ALKALINE SOLUTIONS WERE DRAWN BY POTENTIOSTATIC METHOD FOR O AND H2O2 REDUCTION AND H2O2 OXIDATION PROCESSES.
AD-277 396 DIV. 4

***PACKAGING**

PROPOSED SPECIFICATIONS FOR SPRAYABLE, STRIPPABLE COATING FOR WEATHERPROOFING WEAPONS DURING OVERSEAS STORAGE AND SHIPMENT.
AD-277 466 DIV. 14

***PAPER CAPACITORS**

DEVELOPMENT ENGINEERING TO ESTABLISH MANUFACTURING TECHNIQUES, AND DETERMINE APPROPRIATE OPERATIONS FOR THE PRODUCTION OF LACQUER FILM CAPACITORS. DESIGN, DEVELOPMENT, QUALITY CONTROL, TESTING.
AD-277 222 DIV. 8

***PARABOLIC ANTENNAS**

THE DETERMINATION OF CORRECTIONS TO THE REFLECTING SURFACE OF THE PINCUSHION-TYPE ANTENNA BY THE APPLICATION OF PHOTO MEASUREMENTS.
AD-277 216 DIV. 8

***PARACHUTES**

A SERVICE TEST IS REPORTED OF AN AUTOMATIC CARGO PARACHUTE RELEASE, HAVING A 5,000 LB. CAPACITY.
AD-277 271 DIV. 1

***PARAMETRIC AMPLIFIERS**

DESIGN APPROACH TO A UNI-ENVELOPE, SINGLE ELECTRON BEAM DEVICE INCOMPORATING, LOW NOISE RADIOFREQUENCY AMPLIFICATION, LOCAL OSCILLATION, FREQUENCY MIXING, AND INTERMEDIATE-FREQUENCY AMPLIFICATION.
AD-277 047 DIV. 8

***PARTIAL DIFFERENTIAL EQUATIONS**

GAS LUBRICATED SPHERICAL BEARINGS.
AD-277 179 DIV. 26

***PARTICULATE FILTERS**

GAS PARTICULATE FILTER UNIT: THIS IS A CREW PROTECTIVE SYSTEM MOUNTED IN THE M60 MAIN BATTLE TANK TO REMOVE TOXIC GASES, DIRT AND AEROSOLS FROM THE AIR SUPPLY: THE E37R2 FILTER UNIT.
AD-277 277 DIV. 29

***PERCEPTION**

THE INFLUENCE OF APERTURE DIMENSION ON THE LOWER THRESHOLD OF MOTION WAS INVESTIGATED BY COMPARING THE EFFECTS OF 5 DIFFERENTLY SIZED APERTURE SQUARES ON MOTION THRESHOLD.
AD-277 069 DIV. 28

TIME DISORIENTATION AND ESTIMATION IN ISOLATION: MOST SUBJECTS WERE INACCURATE IN ESTIMATING TIME AND BECAME DISORIENTED FOR TIME IN ISOLATION: SOME COULD NOT TOLERATE 48 HOURS IN ISOLATION.
AD-277 148 DIV. 28

***PERISCOPES**

SERVICE TESTS CONDUCTED UNDER ARCTIC WINTER CONDITIONS TO DETERINE SUITABILITY OF PERISCOPIC TELESCOPE, T-9, FOR ARMY USE.
AD-277 294 DIV. 6

***PEROXIDES**

CATHODIC REDUCTION OF O AND H2O2 ON PT, PD AND IR SMOOTH ELECTRODES. POLARIZATION CURVES IN ACID, NEUTRAL AND ALKALINE SOLUTIONS WERE DRAWN BY POTENTIOSTATIC METHOD FOR O AND H2O2 REDUCTION AND H2O2 OXIDATION PROCESSES.
AD-277 396 DIV. 4

REACTIONS OF BIS(PENTAFLUOROSULFUR) PEROXIDE STUDIES WERE MADE TO LEARN WHETHER THIS COMPOUND REACTS IN A MANNER ANALOGOUS TO THAT OF PEROXYDISULFURYL DIFLUORIDE. CERTAIN PARALLELS WERE OBSERVED.
AD-277 438 DIV. 4

***PERTURBATION THEORY**

GAS LUBRICATED SPHERICAL BEARINGS.
AD-277 179 DIV. 26

THE CONVENTIONAL TECHNIQUES FOR THE LINEARIZATION OF NONLINEAR SYSTEMS.
AD-277 426 DIV. 26

***PHASE SHIFTERS**

UHF FERROMAGNETIC PHASE SHIFTERS (200 - 400 MC) OPERATION BASED ON DOMAIN-WALL RESONANCE: DUAL-MODE NETWORK WITH NONLINEAR PHASE PROPERTIES USED.
AD-277 361 DIV. 8

THE LARGE AREA PN JUNCTION AS A PASSIVE, DISTRIBUTED, 3-TERMINAL DEVICE.
AD-277 371 DIV. 8

***PHOTOELASTICITY**

A METHOD IS DEVELOPED FOR MEASURING PRECISELY FRACTIONAL BIREFRINGENCE BY USING BOTH TRANSMITTED LIGHT AND SCATTERED LIGHT TECHNIQUES.
AD-277 154 DIV. 25

***PIEZOELECTRIC TRANSDUCERS**

PIEZOELECTRIC ELECTROACOUSTIC ENERGY CONVERTER WHICH WILL CONVERT ENERGY IN AN ACOUSTIC FIELD ON THE ORDER OF 173 DB. THE ELECTRICAL OUTPUT MUST BE NOMINALLY 100 VDC. A SCHEMATIC REPRESENTATION IS DERIVED AND ANALYZED.
AD-277 431 DIV. 8

***PLASMA JETS**

THE RESULTS OF SOME PRELIMINARY EXPLORATORY TESTS OF THE GAS DYNAMIC BEHAVIOR OF AN ARGON PLASMA JET SPREADING FROM A SONIC NOZZLE INTO STILL AIR.
AD-277 443 DIV. 25

***PLASMA OSCILLATIONS**

COLLECTIVE MODES IN A PLASMA DUE TO TRANSVERSE INTERACTION.
AD-277 389 DIV. 25

A THEORY OF ELECTRON DENSITY FLUCTUATIONS IN A TWO-COMPONENT PLASMA OF ELECTRONS AND POSITIVE IONS IS DEVELOPED. THE PROPERTIES OF THE GROWING WAVES IN A UNIFORM PLASMA WITH A DOUBLY HUMPED VELOCITY DISTRIBUTION ARE INVESTIGATED.
AD-277 493 DIV. 25

***PLASMA PHYSICS**

RESEARCH CONDUCTED BY THE MICROWAVE RESEARCH INSTITUTE, IN THE FOLLOWING AREAS: IS PRESENTED: ELECTROMAGNETICS, PLASMA ELECTROPHYSICS AND ELECTRONICS, SOLID STATE AND MATERIALS RESEARCH, MICROWAVE CIRCUITS, NETWORK THEORY, SYSTEMS AND CONTROLS.
AD-277 038 DIV. 8

ARC-JET RESEARCH IS BEING CONDUCTED TO OBTAIN INFORMATION FOR IMPROVING THE UNDERSTANDING OF THE COMPLEX PHENOMENA IN PLASMA JET DEVICES THAT EMPLOY GAS-STABILIZED ARC CONFIGURATIONS.
AD-277 193 DIV. 25

A SPECTROGRAPHIC TECHNIQUE IS EMPLOYED TO EVALUATE THE TEMPERATURE IN A PLASMA PRODUCED BY AN ELECTRIC ARC.
AD-277 352 DIV. 25

CONFINEMENT OF ELECTROMAGNETIC WAVES IN WAVEGUIDES HAVING PLASMA WALLS.
AD-277 373 DIV. 25

COLLECTIVE MODES IN A PLASMA DUE TO TRANSVERSE INTERACTION.
AD-277 389 DIV. 25

MICRO-STRUCTURE OF THE MAGNETIC FIELD IN A PLASMA. PART I. STATISTICAL DISTRIBUTION OF STOCHASTIC FIELDS.
AD-277 396 DIV. 25

A VARIATIONAL TECHNIQUE FOR DETERMINING THE PROPAGATING MODES OF A FINITE PLASMA.
AD-277 407 DIV. 25

THE RESULTS OF SOME PRELIMINARY EXPLORATORY TESTS OF THE GAS DYNAMIC BEHAVIOR OF AN ARGON PLASMA JET SPREADING FROM A SONIC NOZZLE INTO STILL AIR.
AD-277 443 DIV. 25

A THEORY OF ELECTRON DENSITY FLUCTUATIONS IN A TWO-COMPONENT PLASMA OF ELECTRONS AND POSITIVE IONS IS DEVELOPED. THE PROPERTIES OF THE GROWING WAVES IN A UNIFORM PLASMA WITH A DOUBLY HUMPED VELOCITY DISTRIBUTION ARE INVESTIGATED.
AD-277 493 DIV. 25

***PLASTICITY**

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AN INVESTIGATION IS REPORTED OF NOZZLE FLOW DYNAMICS OF THE GAS-PARTICLE MIXTURE PRODUCED BY COMBUSTION OF SOLID ROCKET PROPELLANTS CONTAINING METAL ADDITIVES.
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***SPACE FLIGHT**

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A TECHNIQUE IS PRESENTED FOR THE PREDICTION OF THERMAL INPUTS TO TARGETS FROM NUCLEAR WEAPONS. THE GEOGRAPHICAL FACTORS INFLUENCING THE TRANSMISSION OF RADIATION THROUGH CLOUDLESS ATMOSPHERE ARE STUDIED.
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GAS LUBRICATED SPHERICAL BEARINGS.
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THE CONVENTIONAL TECHNIQUES FOR THE LINEARIZATION OF NONLINEAR SYSTEMS.
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***TRANSPORT PLANES**

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***TRAVELING WAVE TUBES**

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THE PROPERTIES OF RING-PLANE SLOW-WAVE CIRCUITS FOR USE WITH HIGH-PERVEANCE BEAMS IN TRAVELING-WAVE TUBES CAPABLE EVENTUALLY OF OPERATING ABOVE 35 KMC WITH A 10% MINIMUM BANDWIDTH WITH EVENTUAL EFFICIENCIES GREATER THAN 10%.
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***TRIAZINES**

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***TRIODES**

DESIGN AND DEVELOPMENT OF A SMALL CERAMIC-METAL ENVELOPE MEDIUM MU TRIODE OF CONCENTRIC CYLINDRICAL CANTILEVER CONSTRUCTION SUITABLE FOR RADIO-FREQUENCY AMPLIFIER APPLICATIONS.
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***TUNGSTEN**

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AD-277 058 DIV. 26

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#TUNGSTEN ALLOYS

DIFFUSION BONDING OF TUNGSTEN AND TUNGSTEN ALLOYS TO PRODUCE HIGH REMELT TEMPERATURES IN BRAZED REFRACTORY METAL JOINTS.
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DUCTILE W SHEET ALLOY. THE BENEFICIAL EFFECTS ON TRANSITION TEMPERATURE AND GRAIN SIZE FROM ADDITIONS OF BINARY COMBINATIONS OF THO2 WITH RE2 O3 OR IN WERE SIGNIFICANT. RECRYSTALLIZATION TEMPERATURE OF W WAS ALSO INCREASED.
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#UNDERGROUND STRUCTURES

A THEORY FOR CALCULATING THE RESPONSE OF A SHOCK-ISOLATED BURIED CYLINDER TO BLAST LOADS IS PRESENTED. A METHOD FOR HARDENING A BURIED SHELTER BY INTERPOSING A CUSHIONING MATERIAL BETWEEN THE SOIL AND THE SHELTER IS PROPOSED.
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#UNDERWATER SOUND TRANSMISSION

A BIBLIOGRAPHY OF HUDSON LABORATORY REPORTS ON UNDERWATER SOUND TRANSMISSION AND RELATED TOPICS. COVERS PERIOD JUNE 1951-AUGUST 1961.
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#UPPER ATMOSPHERE

ATOMIC AND ELECTRONIC COLLISION PROCESSES RELATED TO THE STUDY OF THE UPPER ATMOSPHERE ARE TREATED. PARTICULAR EMPHASIS IS ON PROCESSES PRODUCING VISIBLE RADIATION.
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ANALYSIS OF RECENT ROCKET MONOCHROMATOR MEASUREMENTS OF SOLAR PHOTON FLUXES AND THEIR IONIZING EFFECTS ON THE UPPER ATMOSPHERE AND INTERPLANETARY SPACE.
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#URETHANES

USE OF ISOCYANATE ADDUCTS IN DELAYED-ACTION, ONE-CAN FOAM SYSTEMS, BLOCKING AGENTS, AND RIGID FLEXIBLE FOAM SYSTEMS.
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#VACUUM SYSTEMS

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#VAPOR PLATING

PRODUCTION REFINEMENT OF HIGH STABILITY CHROMIUM-TITANIUM-NITRIDE FIXED FILM RESISTORS.
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#VARIABLE RESISTORS

DESIGN AND PILOT LINE PRODUCTION OF A FAMILY OF GENERAL PURPOSE, SINGLE TURN, VARIABLE, CERMET ELEMENT RESISTORS FOR -65 TO 275 C SERVICE TEMPERATURES.
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#VEHICLE HEATERS

SERVICE TESTS WERE CONDUCTED TO DETERMINE THE SUITABILITY OF THE WINTERIZATION KIT FOR THE M151 UTILITY TRUCK FOR ARMY USE UNDER ARCTIC WINTER CONDITIONS.
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#VIBRATION

THE BIOLOGY OF WHOLE BODY MECHANICAL VIBRATION: AN ANNOTATED BIBLIOGRAPHY.
AD-277 037 DIV. 16

THE TRANSMISSION OF VIBRATION BY TOWED CABLES IS DISCUSSED. A CABLE MOVING IN WATER IS CONSIDERED.
AD-277 138 DIV. 25

ASTIA BIBLIOGRAPHY ON SHOCK AND VIBRATION ENVIRONMENT COVERS REPORTS CATALOGED BY ASTIA FROM 1953 THROUGH JUNE 1962 - CONTAINS 1000 REFERENCES.
AD-277 392 DIV. 25

#VIRGINIA

GEOLOGY OF SOUTHEASTERN VIRGINIA AND ADJACENT COAST AND CONTINENTAL SHELF, WITH REMARKS ON SEDIMENT SAMPLING TECHNIQUES USING VIBRO-DRILLING METHODS.
AD-277 132 DIV. 2

#VISUAL PERCEPTION

THE INFLUENCE OF APERTURE DIMENSION ON THE LOWER THRESHOLD OF MOTION WAS INVESTIGATED BY COMPARING THE EFFECTS OF 5 DIFFERENTLY SIZED APERTURE SQUARES ON MOTION THRESHOLD.
AD-277 069 DIV. 28

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CONSTRUCTION OF AN EXPERIMENTAL MODEL FORMANT VOCODER SPEECH COMPRESSION SYSTEM.
AD-277 009 DIV. 5

AN EVALUATION OF SPEECH COMPRESSION SYSTEMS, CHANNEL VOCODERS OPERATING AT ABOUT 2400 BITS/SEC AND SEMI-VOCODERS AT ABOUT 9600 BITS/SEC OF ADEQUATE INTELLIGIBILITY AND QUALITY FOR MOST MILITARY COMMUNICATIONS.
AD-277 497 DIV. 5

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THE SCOPE OF THIS RESEARCH IS TO DEVELOP AN INSTRUMENT TO REPLACE GYROSCOPES.
AD-277 470 DIV. 30

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EFFECT OF NON-UNIFORM INFLOW CONDITIONS ON THE VIBRATORY PRESSURE GENERATED BY A MARINE PROPELLER. PRESSURE FIELD AROUND A MARINE PROPELLER OPERATING IN A WAKE.
AD-277 208 DIV. 9

#WARFARE

THREAT EVALUATION AND ACTION SELECTION TECHNIQUES FOR LIMITED WAR ENVIRONMENTS. LIMITED WAR ENVIRONMENTAL STUDY 1970-1980.
AD-277 254 DIV. 18

#WAVE TRANSMISSION

POWER AND PSEUDO-ENERGY THEOREMS FOR LOSSLESS, PASSIVE, BIDIRECTIONAL WAVEGUIDES. THEOREMS CONCERN PROPAGATING WAVES, CUTOFF WAVES, AND COMPLEX WAVES.
AD-277 030 DIV. 8

A SURVEY OF DIGITAL COMMUNICATIONS.
AD-277 176 DIV. 5

TRANSMISSION LOSS IN RADIO PROPAGATION: 10 TO 10,000 STATUTE MILES; 10 KC TO 100,000 MC, VERTICAL OR HORIZONTAL POLARIZATION; GEOGRAPHICAL REGIONS.
AD-277 404 DIV. 8

#WAVEGUIDES

POWER AND PSEUDO-ENERGY THEOREMS FOR LOSSLESS, PASSIVE, BIDIRECTIONAL WAVEGUIDES. THEOREMS CONCERN PROPAGATING WAVES, CUTOFF WAVES, AND COMPLEX WAVES.
AD-277 030 DIV. 8

CONFINEMENT OF ELECTROMAGNETIC WAVES IN WAVEGUIDES HAVING PLASMA WALLS.
AD-277 373 DIV. 25

HIGH POWER CIRCULATOR DEVELOPMENT: S BAND. TYPICAL OPERATION AT 2900 MC SHOWS A TRANSMITTER LOSS OF .5 DB AND AN ANTENNA AND RECEIVER LOSS OF 1 DB. HIGH POWER CONTROL IN WAVEGUIDE BY A GYROMAGNETIC ELEMENT LOCATED IN AN AUXILIARY WAVEGUIDE.
AD-277 396 DIV. 8

#WEIGHTLESSNESS

THE SPEED AND ACCURACY OF POSITIONING MOVEMENTS AS FUNCTIONS OF DISTANCE, DIRECTION, AND MASS WERE INVESTIGATED UNDER SIMULATED WEIGHTLESS CONDITIONS.
AD-277 288 DIV. 28

#WET CELLS

DESIGN CRITERIA FOR LONG-LIFE, LIGHT-WEIGHT, SECONDARY BATTERIES WITH MOLTEN SALT ELECTROLYTES AND CERAMIC SEPARATORS.
AD-277 197 DIV. 7

#WINTERIZATION KITS

SERVICE TESTS WERE CONDUCTED TO DETERMINE THE SUITABILITY OF THE WINTERIZATION KIT FOR THE M151 UTILITY TRUCK FOR ARMY USE UNDER ARCTIC WINTER CONDITIONS.
AD-277 278 DIV. 11

#X-RAY DIFFRACTION ANALYSIS

AN INDUCTIVELY-HEATED HIGH TEMPERATURE X-RAY DIFFRACTOMETER FURNACE.
AD-277 190 DIV. 25

#YTTERBIUM

ABSORPTION SPECTRUM OF YTTERBIUM IN SINGLE CRYSTAL OF CALCIUM FLUORIDES.
AD-277 007 DIV. 25

#ZINC

HYDROGEN OVERVOLTAGES OF ANTIMONY, BISMUTH, AND ZINC UNDER VARIOUS EXPERIMENTAL CONDITIONS.
AD-277 018 DIV. 7

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-277 127 Div. 1
(TISTA/SEB) OTS price $1.25

Directorate of Engineering Test, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
FLIGHT VIBRATION SURVEY OF B-58 AIRCRAFT.
Interim rept.,
by H. Kent Reich. Apr 62, 35p. incl. illus. tables.
(Proj. 1309)
(ASD TDR 62-384)
Unclassified report

DESCRIPTORS: *Jet bombers - Vibration. Airframes, Flight, Test methods, Military requirements, Tests, Fuselages, Turbojet engines, Jet engine noise, Aircraft protuberances, Frequency, Triangular wings.

A B-58 aircraft was surveyed to determine the vibration environment existing throughout the vehicle under all flight conditions expected in service. Approximately 11,500 data points were obtained from 20 separate locations on the vehicle during three test flights. The data obtained were evaluated to determine the adequacy of vibration tests requirements for supersonic long range bomber equipment as contained in Specification Nr. Mil-E-5272C. (Author)

AD-277 128 Div. 1
(TISTA/WAW) OTS price $1.00

Directorate of Engineering Test, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
FLIGHT VIBRATION SURVEY OF C-133 AIRCRAFT.
Interim rept.,
by Phyllis G. Bolds. Apr 62, 22p. incl. illus. tables.
(Proj. 1309)
(ASD TDR 62-383) Unclassified report

DESCRIPTORS: *Transport planes - Vibration. Flight testing, Test methods, Military requirements.

A C-133A aircraft was surveyed to determine the vibration environment existing on the fuselage side-wall and the cargo deck under all normal flight conditions. Approximately 9,760 data points were obtained from 16 separate locations on the vehicle during three test flights. The data were evaluated to determine the adequacy of vibration testing requirements of the cargo area and will be used to arrive at a more realistic set of vibration test requirements concerning (1) items of cargo to be transported in such aircraft and (2) items of equipment which will be installed on the cargo deck or fuselage sidewalls of the C-133A. (Author)

AD-277 169 Div. 1, 17
(TISTM/EJH) OTS price $3.60

Institute of Aerophysics, U. of Toronto (Canada).
ON THE PREDICTION OF FATIGUE LIFE UNDER RANDOM LOADING,
by E. D. Poppleton. Feb 62, 32p. incl. illus. tables, 20 refs. (UTIA rept. no. 82)
(Contract AF 49(638)548)
(AFOSR-2258) Unclassified report

DESCRIPTORS: *Fatigue (Mechanics). Deterioration, Loading, Metals, Failure (Mechanics), Stresses, Theory, Structures, Design, Mathematical analysis, Mathematical prediction.

A review is given of some current methods of estimating fatigue damage and a new damage equation is derived based on the work of Corten and Dolan, and Torbe. This equation is applied to the case of a stationary Gaussian stress history and a discussion is given of the parameters appearing in the resulting equation for the fatigue life. (Author)

AD-277 186 Div. 1, 30
(TISTA/SEB) OTS price $5.60

Northrop Corp., Hawthorne, Calif.
STUDY IN THE USE OF STRUCTURAL MODELS FOR SONIC FATIGUE.
Final rept. on Dynamic Problems in Flight Vehicles,
by Cory L. Gray. Apr 62, 49p. incl. illus. tables, 29 refs.
(Contract AF 33(616)7030, Proj. 1370)
(ASD TR 61-547) Unclassified report

DESCRIPTORS: *Airframes - Failure (Mechanics), *Structures - Fatigue (Mechanics), *Jet engine noise - Test methods. Acoustics, Resonance, Theory, Test facilities, Frequency, Instrumentation, Pressure, Dynamics, Airplane panels, Sound, Vibration, Feasibility studies, Model tests, Tests, Test equipment.

The feasibility of employing reduced scale structural models for sonic fatigue testing were examined theoretically and experimentally. Scaling laws for structure and for jet noise sources were presented and theoretical fatigue aspects discussed. Application of the theory to simple flight vehicle type structure was then investigated. Twenty-five panel specimens in three scales and 18 fatigue coupons in two scales were tested to failure with proportionately scaled forcing functions. The results indicate that an empirical relationship between scale factor and fatigue life exists, and that fatigue modeling techniques are feasible and practical. (Author)

AD-277 271 Div. 1, 33
(TISTA/VGW) OTS price $1.60

Army Arctic Test Board, Fort Greely, Alaska.
SERVICE TEST OF RELEASE, AUTOMATIC, CARGO PARACHUTE, 5,000-POUND CAPACITY, WITH LOAD COUPLER.
8 June 62, 16p. incl. illus. tables (Proj. no. ATB 3-292)
Unclassified report

DESCRIPTORS: *Parachutes - Release mechanisms. Air drop operations, Cargo, Arctic regions, Flight testing, Transport planes.

The suitability of the release, automatic, cargo parachute, 5,000 lb. capacity, with load coupler, for use under arctic winter conditions in air delivery operations was determined. (Author)

AD-277 391 Div. 1, 2, 14
(TISTM/EJH) OTS price $5.60

Kaysam Corp. of America, Paterson, N. J.
STUDY OF PHYSICAL AND CHEMICAL CHARACTERISTICS OF BALLOONS AND BALLOON MATERIALS.
Quarterly progress rept. no. 8, 25 Jan-24 Apr 62, by Eric Nelson, ed. by John Kantor. 24 Apr 62, 50p. incl. illus. tables.
(Contract DA 36-039-sc-84925, Proj. 3D36-21-001-04)
Unclassified report

DESCRIPTORS: *Balloons, *Meteorological balloons, *Buoyant materials. Materials, Polymers, Synthetic rubber, Reinforcing materials, Films, Aerodynamic configurations, Configuration, Plasticizers, Mechanical properties, Tensile properties, Elasticity, High altitude, Flight testing.

Studies of variations of balloon properties in aging were concluded. Room-temperature elongations as high as 1300% were obtained for a series of high-altitude, day-flight neoprene balloon compounds. These elongations were coupled with low-room-temperature modulus. Tests at -50C showed that those compounds having the highest room temperature elongations also had elongations generally superior to those normally obtained at -40C. Flights of 700 and 1000 gm balloons made from compound A3-138 were very satisfactory. Good rates of ascent were obtained with compound A3-106 balloons with a free lift of 2500 gms. The effect of pre-elongation on a day-flight compound, A3-105, and a dual-purpose compound, A3-10c was determined at -40 and -70C. Flights with thick-walled balloons having streamlined tails demonstrated the importance of tail length in developing fast ascent rates. Modulus-elongation studies of balloon films are reported.

AD-277 408 Div. 1, 30
(TISTA/VGW) OTS price $4.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
ACTIVITY REPORT.
May 62, 34p. incl. illus.
(ESD TDR 62-23)
Unclassified report

DESCRIPTORS: *Airports - Air traffic control systems, *Air traffic control systems, *Airport radar systems. Ground controlled approach radar, Glide path systems, Radio beams, Runway lights, Aviation safety, Display systems, Altimeters, Weather forecasting.

Studies are summarized with regard to approach and landing systems, airport lighting systems, communications, data acquisition and processing, navigation, research activities, helicopter traffic simulation, aircraft safety, and weather data processing systems. (Author)

AD-277 468 Div. 1
(TISTA/VGW) OTS price $12.00

Computer Engineering Associates, Inc., Pasadena, Calif.
OPTIMUM STRUCTURAL REPRESENTATION IN AERO-ELASTIC ANALYSES.
Final rept. for 5 Oct 60-27 Oct 61 on Electronic Analog Computer Study of Approximate Flexible Airframe-Autopilot Transfer Functions,
by Robert G. Schwendler and Richard H. MacNeal. Mar 62, 157p. incl. illus. tables, 21 refs.
(Contract AF 33(616)7658, Proj. 8219)
(ASD TR 61-680) Unclassified report

DESCRIPTORS: *Airframes - Elasticity, *Aerodynamic configurations - Stresses. Structures, Stability, Control systems, Deformation, Vibration, Damping, Aerodynamics, Mathematical analysis, Matrix algebra, Analog systems, Analog computers.

An investigation of optimum methods for the mathematical representation of the structure of an airborne vehicle is described. Emphasis was placed on aeroelastic problems associated with stability and control, but the results and conclusions of the study are applicable to any aeroelastic problem. A method is presented whereby the elasticity of the structure is completely and rigorously included while the mass of the structure is expressed in terms of a finite number of normal coordinates of the system. Analog computer investigations of the dynamic response of three typical aircraft configurations were made using the method described. These analog computer investigations demonstrate the utility of the structural representation presented and also define the approximations which can be made in the representation in terms of the requirements of any particular analysis. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-277 003 Div. 2
(TISTP/JW) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
THE ROLE OF ADVECTION IN THE FORMATION OF VORTEX CLOUD PATTERNS,
by John A. Leese. Feb 62, 27p. incl. illus. 14 refs. (GRD research notes no. 78; AFCRL 62-286)
(In cooperation with Michigan U. College of Engineering, Ann Arbor)
Unclassified report

DESCRIPTORS: *Clouds, *Air mass analysis. Vortices, Cyclones, Temperature inversion.

A case study of the spiral cloud patterns associated with an atmospheric vortex, as seen by the TIROS I meteorological satellite, shows that advection can be a dominant mechanism in the formation of these patterns. This advection is then interpreted in terms of the horizontal and vertical structure of the low pressure system with which the clouds are associated. A comparison of the vortex cloud patterns, at the time of the maximum development of the spiral clear area, with Bergeron's two common types of cold fronts indicates that these patterns should be attributed to upper-air advection relative to the surface front rather than to vertical motion along the front. The similarities displayed by the spiraling vortex cloud patterns seen by TIROS I would suggest that the features found in this detailed case study would also hold for other cases in which this particular

cloud pattern exists. The spiraling vortex patterns can be associated with a low pressure area on the surface analysis, but no general statement can be made that the reverse is also true. This case study indicates that the TIROS pictures are particularly well suited for the study of horizontal advection and show promise of yielding quantitative information. (Author)

AD-277 004 Div. 2
(TISTP/JW) OTS price $8.10

Air Force Cambridge Research Labs., Bedford, Mass.
THE RELATIONSHIP BETWEEN LARGE-SCALE VERTICAL MOTION AND SKY COVER,
by Robert C. Curtis, John A. Leese, and Francis R. Valovcin. Feb 62, 82p. incl. illus. tables, refs. (GRD research notes no. 77; AFCRL 62-425)

Unclassified report

DESCRIPTORS: *Sky, *Northern hemisphere, *Air mass analysis. Convection, Atmosphere, Clouds.

The characteristic features of the sky cover in the northern hemisphere and their relationship to large-scale vertical motion are discussed. Evidence is presented in support of the hypothesis that the principal characteristics of the sky cover--amount and average height of cloud tops--are primarily determined by the large-scale vertical motion, with convection playing a secondary role. Some implications of this hypothesis for analysis and forecasting of cloudiness and for the use of satellite observations of clouds and radiation in studies of atmospheric dynamics are mentioned. (Author)

AD-277 005 Div. 2, 25
(TISTP/WH) OTS price $8.10

Air Force Cambridge Research Labs., Bedford, Mass.
EFFECTIVE TRANSMISSION OF THERMAL RADIATION FROM NUCLEAR DETONATIONS IN REAL ATMOSPHERES,
by John P. Cahill, Hervey P. Gauvin, and John C. Johnson. Apr 62, 72p. incl. illus. tables, 22 refs. (Air Force Surveys in Geophysics no. 144; AFCRL 62-456)

Unclassified report

DESCRIPTORS: *Thermal radiation, *Atmosphere, *Thermal conductivity, *Nuclear explosions. Heat, Transmission, Meteorology, Atmosphere models.

The objective of this analysis is to provide as simple a technique as practicable for the prediction of thermal inputs to targets from nuclear weapons, consistent with a moderate degree of confidence, for use in the field with available meteorological data. A study is made of the geographical factors influencing the transmission of thermal radiation from nuclear weapons through cloudless atmospheres. Results are presented as the ratio of the irradiance received on a 2 pi detector in the presence of an attenuating atmosphere to the irradiance expected on the same detector in free space. The primary influencing factors considered are the scattering and absorbing properties of the atmosphere, reflection from the underlying surface, the temperature-time characteristics of the source, and the source-detector geometry. The results are presented graphically, with contours of t (effective transmission) for each atmospheric model studied. Ground level visual ranges of 2, 10, and 50 nautical miles were incorporated into both wet and dry atmospheres, which in turn were terminated with a surface having albedos of either 0, 0.2, or 1.0. (Author)

AD-277 014 Div. 2
(TISTP/GRW) OTS price $2.60

Lamont Geological Observatory, Palisades, N. Y.
A SUSPENDED-DROP CURRENT METER,
by E. M. Thorndike. Mar 62, 16p. illus. 4 refs.
(Technical rept. no. 4; CU-4-62)
(Contract Nonr-26648)

Unclassified report

DESCRIPTORS: *Ocean currents. Measurement, Ocean bottom, Test equipment, Reliability, Test methods.

A simple and direct method for measuring ocean currents is given by providing an identifiable point in the water and determining its displacement in a known time interval. The speed is obtained by dividing the displacement by the time, and the direction of the velocity is the direction of the displacement. The method is capable of measuring very small velocities and also rather large ones. An identifiable point can be provided by a small drop of colored liquid having approximately the same density as sea water but being immiscible with it. Positions can be obtained from photographs of the drop. Knowledge of the time intervals between photographs can be provided by a motor-driven timer or by a watch. A magnetic compass in the field of view of the camera that photographs the drop can provide the direction. (Author)

AD-277 017 Div. 2, 25
(TISTP/WH) OTS price $8.60

Liege U. (Belgium).
RESEARCH ON RELATIONS BETWEEN COMETARY, SOLAR AND UPPER ATMOSPHERIC PHYSICS,
by P. Swings. 31 Mar 62, 94p. incl. tables, 37 refs.
(Contract AF 61(052)24)
(AFCRL 62-625) Unclassified report

DESCRIPTORS: *Astrophysics, *Spectrographic analysis. Aurorae, Comets, Planetary atmospheres, Atmosphere, Particles, Ultraviolet radiation, Infrared radiation.

Contents:
Spectra of the aurorae
Physics of comets
Laboratory work related to cometary spectra
Behavior of various forbidden and permitted lines in atmospheric and astronomical spectra
Mie scattering by solid particles
Vacuum ultraviolet spectroscopy of atmospheric and cometary molecules
Possibilities of observations from space vehicles

AD-277 059 Div. 2
(TISTP/GRW) OTS price $1.10

Air Proving Ground Center, Eglin Air Force Base, Fla.
CALIBRATION OF INSTRUMENTS FOR RADIATION MEASUREMENTS FROM LOFTED VEHICLES.
Rept. on Measurements of Missile Radiation from Lofted Vehicles,
by W. O. Banks. May 62, 8p. incl. illus. (Rept. no. APGC TDR 62-27)
(Proj. 5043)

Unclassified report

DESCRIPTORS: *Radiometers, *Sounding rockets. Calibration, Test methods, Radiation counters, Space environmental conditions, Simulation.

The designs and developments accomplished by the Air Proving Ground Center in support of Project TRUMP are considered. Project TRUMP pertains to the design and development of methods for

measuring radiation from lofted vehicles. Several methods of simulating the space environment, for purposes of ground calibration of instruments to be lofted, are proposed. A mathematical approach, similar to that used by early Smithsonian solar constant seekers, is presented. (Author)

AD-277 071 Div. 2
(TISTP/JW) OTS price $7.60

Lowell Observatory, Flagstaff, Ariz.
THE STUDY OF SOLAR ENERGY OUTPUT FROM 1953 TO 1961 BY DIFFERENTIAL METHODS,
by John S. Hall, H. L. Johnson and others.
Apr 62, 1v. incl. illus. tables, 15 refs.
(Scientific rept. no. 1)
(Contract AF 19(604)8031, Proj. 5219)
(AFCRL 62-476) Unclassified report

DESCRIPTORS: *Solar energy, *Transformations (Mathematics). Sun, Uranus, Planets, Stars, Photographic recording systems.

This report includes:
THE SUN AS A VARIABLE STAR II. PHOTOMETRIC OBSERVATIONS OF URANUS, NEPTUNE AND STANDARD STARS IN THE YEARS 1953-1961, by K. Serkowski.
2 Aug 61 (Reprint from Lowell Observatory Bull. no. 116, 5:157-226)
(Contracts AF 19(604)291, AF 19(604)2077, and AF 19(604)8031)

The method used in the reduction of two-color photometric observations is described. Sixteen standard stars of nearly solar type were regularly observed for 7 years and no systematic changes in their brightness were found. The r.m.s. deviation of the yearly mean blue magnitude for none of these stars exceeds ±0m.009. No systematic change in the blue magnitudes of Uranus and Neptune over a period of nine oppositions is obtained if the following conditions are fulfilled: the gradient of the energy distribution in the spectrum of each of these planets within the blue filter spectral region is assumed to be the same as for a star with the same B-V color-index as the planet, and with regard to Uranus only, the photometric effects due to its oblateness are half as great as those for the uniform distribution of brightness over the apparent disc of the planet. (Author)

AD-277 125 Div. 2
(TISTP/JW) OTS price $4.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
BIBLIOGRAPHY ON THE MOON AND ITS CHARACTERISTICS, by John B. Forlini. Apr 62, 38p. (LTIS Bibliography no. 15)
Unclassified report

DESCRIPTORS: *Moon, *Bibliography. Space environmental conditions, Lunar probes, Surfaces, USSR.

AD-277 132 Div. 2
(TISTP/JW) OTS price $4.60

Yale U., New Haven, Conn.
GEOLOGY OF SOUTHEASTERN VIRGINIA AND ADJACENT COAST AND CONTINENTAL SHELF, WITH REMARKS ON SEDIMENT SAMPLING TECHNIQUES USING VIBRO-DRILLING METHODS.
Annual rept.,
by John E. Sanders, Richard F. Flint and others.
June 62, 45p. incl. illus. 47 refs.
(Contract Nonr-60940, Proj. NR 388-064)
Unclassified report

DESCRIPTORS: *Geology, *Virginia. Topology, Sampling, Drilling machines.

AD-277 158 Div. 2
(TISTP/GRW) OTS price $14.50

High Altitude Observatory, Boulder, Colo.
THE CENTER-TO-LIMB VARIATION OF H-ALPHA, H-BETA, AND H-GAMMA IN THE SOLAR SPECTRUM.
Doctoral thesis,
by Oran Richard White. Mar 62, 197p. incl. illus. tables, 61 refs. (Scientific rept. no. 1)
(Contract AF 19(604)6664)
(AFCRL 62-631) Unclassified report

DESCRIPTORS: *Solar spectrum. Measurement, Spectrographic analysis, Temperature.

New observations and a new analysis of the limb darkening in H-alpha, H-beta, and H-gamma are presented. The observations are made in the form of monochromatic scans along a north-south diameter of a solar image. This new observing technique shows clearly the intensity fluctuations that appear as the characteristic mottling in H-alpha filtergrams; however, it also gives enough datum points in quiet solar regions to allow the empirical definition of a quiet, average solar atmosphere. At the center of the disc, the average central intensities for H-alpha, H-beta, and H-gamma are, respectively, .154, .130, and .142 (± .001) in units of the continuum at the center of the disc. The analysis of the observations is based only on three assumptions: (1) a spherically-symmetric atmosphere, (2) a frequency-independent source function, and (3) a Gaussian absorption coefficient. (Author)

AD-277 159 Div. 2, 25
(TISTP/JW) OTS price $13.00

High Altitude Observatory, Boulder, Colo.
DEPARTURES FROM THERMODYNAMIC EQUILIBRIUM IN CHROMOSPHERIC MAGNESIUM I, CALCIUM I, AND OXYGEN I.
Doctoral thesis,
by Lewis L. House. Mar 62, 173p. incl. illus. tables, 71 refs. (Scientific rept. no. 2)
(Contracts AF 19(604)6664 and AF 19(604)2140)
(AFCRL 62-632) Unclassified report

DESCRIPTORS: *Solar atmosphere, *Special functions. Oxygen, Colorimetry, Helium, Magnesium, Calcium, Theses, Heat.

An observational and theoretical study is combined for the purpose of investigating departures from thermodynamic equilibrium in neutral magnesium, calcium, and oxygen in the solar chromosphere. The observational data are reduced from 1952 eclipse plates taken by the High Altitude Observatory staff. From the comparison of line intensities, it is possible to show that the population of the energy levels of Mg I and O I depart from a Boltzmann distribution. These departures are in the same sense as those found for helium, that is, the population of the metastable triplet level (or quintet for O I) is enhanced relative to the population of the excited singlet levels (triplets O I). A search for similar effects between upper triplet and singlet states of Ca I does not indicate significant departures from the Boltzmann distribution. (Author)

AD-277 183 Div. 2
(TISTP/JW) OTS price $10.10

McGill U. (Canada).
PRECIPITATION STUDIES.
Final rept., Apr 57-Dec 61.
Apr 62, 94p. incl. illus. tables, 9 refs.
(Contract AF 19(604)2065, Proj. 8620)
(AFCRL-62-459) Unclassified report

DESCRIPTORS: *Meteorological data, *Precipitation. Weather forecasting, Attenuation, Hail, Snow, Freezing.

This report includes:
ALBERTA HAIL STUDIES, 1961, by A. E. Carte, R. H. Douglas and others. Dec 61, (Scientific rept. no. MW-35)

AD-277 251 Div. 2
(TISTP/JW) OTS price $6.60

Texas Instruments, Inc., Dallas.
THE DETECTION OF SUBSURFACE VOIDS BY GRAVIMETRY. Final rept.,
by Frederick E. Romberg. 20 Sep 61, 67p. incl. illus.
(Contract AF 19(604)8348)
(AFCRL-1014) Unclassified report

DESCRIPTORS: *Gravimetric analysis, *Geographical property. Geology, Gravity, Earth, Maps.

The detection of voids in the near subsurface of the earth by gravimetric methods has been studied in theory and practice and is presented. The gravitational anomalies on the surface that would be caused by subsurface voids of different sizes and depths are described in a theoretical treatment derived from elementary laws. Instructions are supplied on how to interpret observed negative gravity anomalies in terms of the voids that give rise to them. A set of charts is provided which gives directly and conversely the probable size and depth of voids from the magnitude and shape of observed anomalies. Since the interpretation problem does not have a unique solution, the validity of interpretation methods depends on the geologic environment and on the skill of the interpreter, and the limitations imposed by this dependence are examined. Field experiments, in two different locations are reported. Negative anomalies were observed in both locations, one due to a known void and others due either to actual voids or to spaces in the earth where heavy material is replaced by lighter material, thus changing the suitability of the location for construction purposes. The effects of rough surface terrain, and the effectiveness of methods used for correcting it, are shown. A map, and discussion, of areas in the United States where shallow voids may exist are furnished. (Author)

AD-277 253 Div. 2
(TISTP/JW) OTS price $9.60

Arctic Inst. of North America, Washington, D. C.
OCEANOGRAPHIC OBSERVATIONS AT FLETCHER'S ICE ISLAND (T-3) IN THE ARCTIC OCEAN IN 1959-1960,
by Kou Kusunoki, Jiro Muguruma and Keiji Higuchi. Mar 62, 110p. incl. illus. tables, 15 refs. (Research paper no. 22; Scientific rept. no. 4)
(Contract AF 19(604)8343; Continuation of Contract AF 19(604)3073)
(AFCRL-62-479) Unclassified report

DESCRIPTORS: *Oceanographical data, *Arctic regions. Temperature, Salinity, Ice, Chemical analysis, Sea water.

Oceanographic observations in the southern Beaufort Sea of the Arctic Ocean were conducted at Fletcher's Ice Island (T-3) between June 1959 and September 1960. Analysis of data on temperature, salinity, and chemical elements revealed five major water masses in this region: Arctic Surface Water, Upper Intermediate Water, Atlantic Water, Low Intermediate Water, and Deep Shelf Water. Intrusion of relatively warm Pacific Water along the 25.5 - 26.0 isopycnal surface at about 75 m was characteristic. The temperature structure of the deep water in the Beaufort Basin showed that there is a relatively warm water mass at depths below 880 m (Lower Intermediate Water), which is warmer than bottom waters in the Atlantic Water occurring between the upper and lower 0 C isotherms (250 m and 880 m respectively) is characterized by positive temperatures, having a maximum of 0.45 C at about 450 m. Deep Shelf Water is found at 15 m to 40 m on the very shallow continental shelf, being characterized by relatively low temperatures and abundance of silicon. Seasonal changes in temperature and other oceanographic elements in the surface layer are described in connection with summer heating and winter ice formation. (Author)

AD-277 264 Div. 2
(TISTP/JW) OTS price $4.60

McGill U. (Canada).
INTERIM ACCOUNT OF HAIL STUDIES,
by R. H. Douglas, J. S. Marshall, and R. H. D. Barklie. Apr 62, 46p. incl. illus. tables, refs.
(Scientific rept. no. MW-34)
(Contract AF 19(604)2065, Proj. 8620)
(AFCRL 62-457) Unclassified report

DESCRIPTORS: *Hail. Storms, Precipitation, Nucleation, Melting, Temperature, Radar scanning, Alberta.

Contents:
Interim account of Alberta hail studies
Size distributions, ice contents and radar reflectivities of hail in Alberta
Radar observations of Alberta hailstorms
Inter-relation of the fall speed of rain and the updraft rates in hail formation
Heterogeneous nucleation is a stochastic process
Nucleation measurements on rain and melted hail

AD-277 280 Div. 2
(TISTP/JW) OTS price $10.10

Army Ordnance Missile Command, Redstone Arsenal, Huntsville, Ala.
AOMC CLIMATOLOGICAL RINGBOOK. PART XX. EMPIRICAL FREQUENCY DISTRIBUTIONS OF WIND COMPONENTS AT CONSTANT ALTITUDE LEVELS, PORT LYAUTEY, MOROCCO,
by Werner H. Alfuth and Armstead P. Alsobrook. 3 Nov 61, 121p. incl. tables, 4 refs. (Rept. no. RR-TR-61-24)
Unclassified report

DESCRIPTORS: *Atmosphere, *Barometric pressure, *Temperature, *Density. High altitude, Periodic variations, Statistical analysis, Tables, Atmosphere models, Handbooks, Moscow.

Climatological parameters of scalar winds, zonal and meridional wind components, semiplanar winds and wind shear at 1 km altitude intervals are presented for the location Port Lyautey, Morocco. The frequency distributions have been established for the 12 monthly and the annual reference periods with values of cumulative percentage frequency corresponding to the mean and plus and minus one, two and three sigma levels of normal distribution. The statistical information is based on the observational period 1951 - 1957. (Author)

AD-277 357 Div. 2
(TISTA/VGW) OTS price $8.60

California U., Los Angeles.
RECENT ADVANCES IN ASTRODYNAMICS, 1961,
by Robert M. L. Baker, Jr. and Mary P. Francis. Jan 62, 80p. refs. (Astrodynamical rept. no. 13)
(Contract AF 49(638)498; In cooperation with

Lockheed Aircraft Corp., Burbank, Calif.)
(AFOSR-2551) Unclassified report

DESCRIPTORS: *Astronautics, *Orbital flight paths - Space flight, *Space flight - Mathematical prediction, *Astrophysics. Perturbation theory, Celestial mechanics, Exterior ballistics, Spaceships, Space probes, Lunar probes.

The review surveys eight subdivisions within astrodynamics: geometry, coordinate systems and ephemerides; astrodynamic constants (including heliocentric, genocentric, lunar and planetary, and atmospheric constants); orbit determination; orbit perturbations (gravitational and non-gravitational); orbit prediction (using both special and general perturbation techniques); applications (orbit selection and optimization, low thrust orbits, geocentric orbits, lunar, planetary and interplanetary orbits); observation theory; and attitude dynamics. Each subdivision is introduced and a number of the outstanding research papers in each area are mentioned. Specifically, an effort is made to delineate voids in our knowledge and to point up areas of profitable future research in astrodynamics. (Author)

AD-277 359 Div. 2
(TISTP/GRW) OTS price $1.10

Radio Observatory, Calif. Inst. of Tech., Pasadena.
OBSERVATIONS OF THE CALIFORNIA INSTITUTE OF TECHNOLOGY RADIO OBSERVATORY, OWENS VALLEY, CALIFORNIA 1962. 2. THE RADIO SOURCE HERCULES A,
by P. Maltby, T. A. Matthews, and A. T. Moffet. 1962, 5p. illus. tables, 13 refs.
(Contract Nonr-22019)
Unclassified report

DESCRIPTORS: *Radio astronomy. Sources, Galaxies, Identification, Position finding.

AD-277 383 Div. 2, 25
(TISTA/VGW) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
GUENTER LOESER MEMORIAL LECTURE 1960. INTERPLANETARY IONIZATION BY SOLAR EXTREME ULTRAVIOLET RADIATION,
by Hans H. Hinteregger. 1960, 19p. incl. illus. table, 13 refs. (Rept. no. AFCRL 62-484)
Unclassified report

DESCRIPTORS: *Upper atmosphere - Ionization, *Ionosphere - Solar energy, *Space environmental conditions - Ionization. Ultraviolet radiation, Photons, X rays, Radiation effects, Geophysics, Space probes, Hydrogen, Oxygen, Nitrogen, Helium.

From recent rocket monochromator measurements of solar photon fluxes phi(lambda) between 1300 and 60 A around 200 km, the fluxes phi sub o characteristic of the upper F sub 2-region and interplanetary space near the earth are estimated by assuming some reasonable spectral attenuation factors phi/phi sub o because of the atmospheric absorption above the point of observation. Ionization rates in terms of sigma sub j phi sub o are estimated for H, O, N, and N2. The estimated total ionization rate for the hydrogen atom of about 5 x 10 to the -7th power per sec implies a fractional ionization of at least 99.9% for total hydrogen particle number densities of less than about 500 per cc. (Author)

AD-277 428 Div. 2
(TISTP/JW) OTS price $3.60

Electrical Engineering Research Lab., U. of Texas, Austin.
INVESTIGATION OF LARGE SCALE INHOMOGENEITIES IN THE EARTH BY MAGNETOTELLURIC METHOD,
by F. X. Bostick, Jr. and H. W. Smith. 1 June 62, 16p. illus. 12 refs. (Rept. no. 127)
(Contract Nonr-37514, Proj. NR 371-032)
Unclassified report

DESCRIPTORS: *Terrestrial magnetism, *Analysis of variance. Polarization, Earth, Magnetic fields, Electric fields.

In the magnetotelluric analysis proposed by Cagniard, a resistivity profile of a homogeneous stratified earth model is determined from the ratio of the tangential components of the natural electric and magnetic fields at the surface of the earth. This type of analysis is often confused by the fact that apparent resistivity estimates obtained from data recorded at one site on different occasions may vary considerably. Also the apparent resistivities computed from one component of the E field and its orthogonal H field component may be significantly different from those computed from another pair of orthogonal field components. Cantwell points out that these variations may, at least in part, be due to two dimensional inhomogeneities and/or anisotropies together with randomly polarized magnetotelluric fields. Accordingly, he has suggested testing the wave impedance of the earth as a rank two tensor. This report describes a measurement and analysis procedure developed using a model based on a two dimensional wave impedance tensor. A rotation of the measuring axis to minimize the main diagonal terms in the impedance tensor yields a reasonably consistent estimate of the direction and magnitude of a major inhomogeneity in the apparent resistivity profile. (Author)

AD-277 429 Div. 2, 30
(TISTP/JW) OTS price $3.60

Electrical Engineering Research Lab., U. of Texas, Austin.
CO-OPERATIVE GEOMAGNETIC MEASUREMENT PROGRAM OF THE PACIFIC NAVAL LABORATORY, THE UNIVERSITY OF BRITISH COLUMBIA, THE UNIVERSITY OF ALBERTA, THE UNIVERSITY OF TEXAS,
comp. by H. W. Smith. 31 May 62, 19p. illus. 7 refs. (Rept. no. 128)
(Contract Nonr-37514, Proj. NR 371-032)
Unclassified report

DESCRIPTORS: *Terrestrial magnetism, *Meteorology. Microwaves, Measurement, Research program administration.

A cooperative geomagnetic measurement program is described. Data were taken during the months of June and July, 1960, but only two periods were considered to be worthy of analysis. These periods were the geomagnitivity on July 4, 1960, and pearl activity on June 9, 1960. Analysis includes spectra, coherency, and a comparison of envelopes for the July 4 data, and a comparison of the pearl signals and onset time for the June 9 data. (Author)

AD-277 438 Div. 2
(TISTP/JW) OTS price $3.60

Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE. REVIEW OF

SOVIET LITERATURE.
Monthly rept. no. 25 for May 62.
31 May 62, 29p. incl. illus. 16 refs. (AID rept. no. 62-72)
Unclassified report

DESCRIPTORS: *Atmosphere, *Meteorology, *Bibliography. Ionosphere, Van Allen radiation belt, USSR, Cosmic rays, Tellurides.

AD-277 440 Div. 2
(TISTP/JW) OTS price $4.60

Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE REVIEW OF SOVIET LITERATURE.
Monthly rept. no. 24 for Apr 62.
30 Apr 62, 47p. incl. table, 27 refs. (AID rept. no. 62-55)
Unclassified report

DESCRIPTORS: *Atmosphere, *Meteorology, *Bibliography. Ionosphere, Van Allen radiation belt, USSR, Cosmic rays, Tellurides.

AD-277 456 Div. 2, 24
(TISTP/JW) OTS price $8.10

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
AUTOMATIC MAP COMPILATION SYSTEM.
Final technical rept. on Phase 1,
by H. M. Beckwith. 22 Jan 62, 83p. incl. illus.
(Rept. no. C129-2U2)
(Contract DA 44-009-eng-4596)
Unclassified report

DESCRIPTORS: *Mapping, *Electronic circuits, *Optical systems, *Digital computers. Analog systems, Electronic scanners, Position finding, Altimeters, Correlation techniques, Aerial photographs, Mathematical analysis.

The Automatic Map Compilation System utilizes a small digital computer which directs an analog system to the indicated homologous points for an estimated height on a stereo diapositive pair. An analog scan, with associated correlation equipment, operates to measure the height error. The detailed terrain data obtained from the scan is used to produce an orthophoto and the altitude measurement is used to produce a drop-line chart from which the contour lines can be drawn. The system analysis, mechanical design, and computer program did not reveal any serious problems. The design is quite straightforward although there are many areas where the stringent accuracy requirements dictated unusual solutions. The mechanical system is quite conventional, with carriage supports consisting of V-groove ways using ball bearing blocks and servomotors coupled through precision ball-nut screws and anti-backlash gears. The control system utilizes 400-cps components, thereby providing higher speed capabilities and a larger range of design components to select from. The orthophoto and drop-line chart are produced photographically, the latter by a print-out of three gray tones defining the desired contour intervals. (Author)

AD-277 474 Div. 2
(TISTP/GRW) OTS price $2.60

California U., Berkeley.
PRESSURE AS A FUNCTION OF DISTANCE. PART I,
by F. N. David. 1 May 62, 26p. incl. tables.
(Scientific rept. no. 2)
(Contract AF 19(604)8051, Proj. 8624)
(AFCRL 62-461, pt. 1) Unclassified report

DESCRIPTORS: *Barometric pressure. Diurnal variations, Position finding, Height finding, Polynomials, Least squares method.

Material is used which consists of the daily pressures at stations in the United States and Canada for the three months January, February, March of the years 1949-1953. The height at which the pressure is 500 mb is found, and the correlation coefficient between these heights, taking each station in turn with every other station, are calculated. Enough stations were taken to enable contour lines to be drawn of these 500 mb heights. Using each station as center in turn, it is also possible to draw equi-correlation coefficient contours. A marked similarity is apparent between the pressure maps and the correlation maps. The ultimate objective is to devise a functional form which will adequately describe the correlation surface and permit the construction of a functional relationship between pressure and distance. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

No Entries

4. CHEMISTRY

AD-277 010 Div. 4
(TISTM/TCG) OTS price $6.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
CHEMICAL REACTIONS USING MODULATED FREE RADICAL BEAMS, PART A. THE VAPOR PRESSURE OF SOLID HYDROGEN IN THE TEMPERATURE RANGE FROM 4.7 K TO 11.1 K. PART B.
Final rept., 1 Feb-31 Jan 62,
by H. Harrison, W. L. Fite, and G. L. Guthrie.
28 Feb 62, 63p. incl. illus. tables, 35 refs.
(Rept. no. GA-2972)
(Contract AF 49(638)301)
(AFOSR-2357) Unclassified report

DESCRIPTORS: *Hydrogen - Physical properties, *Free radicals, *Molecular beams. Chemical reactions, Isotopes, Elastic scattering, Modulation, Mass spectrometers, Cryogenics, Solids, Vapor pressure, Reaction kinetics.

Modulated, crossed molecular beams were employed to study the chemical kinetics of several free-radical reactions. For the hydrogen-isotope exchange (H + D2 yields HD + D) signals were detected which correspond to a reaction cross-section of approximately 10 to the -19th power sq cm. Elastic scattering complicates the

interpretation. The promises, methods, and difficulties of the crossed-beam technique are discussed. Measurements were made of the vapor pressure of solid H, of a nominal 75% ortho-hydrogen composition, from 4.7 to 11.1 K. The results were fitted to Kirchoff's equation. A suitable expression for the vapor pressure was found to be log P(mm) equals -43.39/T + 5/2 log T(K) plus 2.047 from 4.7 to 13.95 K. (Author)

AD-277 031 Div. 4
(TISTM/TCG) OTS price $1.50

Naval Research Lab., Washington, D. C.
A REVIEW OF MONOETHANOLAMINE CHEMISTRY,
by M. A. Scheiman. 1 June 62, 51p. incl. illus. tables, 90 refs. (NRL rept. no. 5746)
Unclassified report

DESCRIPTORS: *Ethanols, *Amines - Chemistry, *Bibliography - Amines. Chemical reactions, Chemical properties, Physical properties, Synthesis, Viscosity, Dielectric properties, Molecular structure, Solubility, Decomposition, Thermodynamics, Nuclear propulsion, Submarines, Carbon dioxide, Decontamination, Pharmacology.

This report is a review of the physical properties and chemical reactions of monoethanolamine (MEA) and its degradation products. Among the topics discussed are a compilation of 27 different and suitably referenced physical and chemical properties of MEA, its commercial preparation, action of bacteria, pharmacology, physical chemistry, chemical reactions of MEA, and a section on the analytical processes applicable to MEA. The section on the physical chemistry is further subdivided into the structure of liquid MEA, viscosity and dielectric constant, solubilities of salts in MEA, basic function of MEA, thermodynamics of ionization, and the heat of vaporization. The section on the chemical reactions of MEA is further subdivided into addition or salt formation, reaction with nitrous acid, acylation, the formation of piperazine, cyanoethylation, reaction of MEA with aldehydes and ketones, reaction with CO2, double salts, reaction of Fe and MEA, complex formation of MEA with the heavy metals, reducing action and the reaction with oxygen. (Author)

AD-277 157 Div. 4, 16, 1, 12
(TISTM/REB) OTS price $8.10

Douglas Aircraft Co., Santa Monica, Calif.
INITIAL SURVEY OF PUBLISHED WORK IN THE FIELD OF CARBON MONOXIDE OR OTHER DIATOMIC MOLECULAR GASES WITH PARTICULAR REFERENCE TO POSSIBLE SENSING SYSTEMS,
by C. S. Hellmann. 25 Sep 61, 75p. incl. illus. tables, 59 refs. (Rept. no. SM-38861)
Unclassified report

DESCRIPTORS: *Carbon monoxide indicators, *Carbon compounds, *Monoxides, *Gas detectors, *Bibliography - Monoxides. Feasibility studies Gases, Physiology.

The provision of a carbon monoxide sensor as a novel and necessary new item of research equipment is discussed. Primary emphasis is placed on possible means of achieving a practical sensor design; appendices include the basic derivations and terminology peculiar to the fields of chemical and molecular physics, with accent on molecular spectrography. Bio-physical aspects and other possible uses are noted. A complete table of constants as a possible design basis is included in the main text and amplified in the appendices. (Author)

AD-277 208 Div. 4, 25
(TISTM/REB) OTS price $9.10

Theoretical Chemistry Lab., U. of Wisconsin, Madison.
A METHOD FOR CALCULATING VIBRATIONAL TRANSITION PROBABILITIES.
Rept. on Theoretical Foundations For Properties of High Temperature Gases,
by K. Cashion. 1 May 62, 98p. incl. illus. tables, 44 refs. (Rept. no. WIS-AF-20, Series 3)
(Contract AF 33(657)7311)
Unclassified report

DESCRIPTORS: *Electron transitions. Vibration, Probability, Gases, Molecules, High temperature research, Determination, Molecular spectroscopy, Quantum mechanics.

Relative vibrational transition probabilities for diatomic molecules can be calculated by methods utilizing band intensity observations or by methods not requiring such data. The latter class has been represented solely by the linear dipole moment function approximation. A second such method is developed which makes use of wave function expansion technique of Trischka and Salwen (Jnl. Chem. Phys. 31:218, 1959). Its critical assumption is the approximate equivalence of the Morse and simple harmonic potentials in the region about the potential minimum. This assumption is sufficient to remove all ambiguity in the relative signs of the matrix elements of the dipole moment. It provides a relation through which the relative magnitudes of the matrix elements can be calculated. This method is equivalent to using Morse eigenfunctions with a dipole moment function which departs from linearity in a manner that is qualitatively correct, at least in the region of the equilibrium configuration. Insofar as the limited intensity data can show, it is generally superior to the linear approximation. (Author)

AD-277 211 Div. 4
(TISTM/TCG) OTS price $1.00

Technische Hochschule, Munich (Germany).
RESEARCH ON HYDROGEN EVOLUTION AND DISSOLUTION.
Final rept. for Oct 59-Sep 60 on Surface and Interface Phenomena of Matter,
by M. Breiter, L. Kandler and others.
Mar 62, 26p. incl. illus. tables, 27 refs.
(Contract AF 61(052)305, Proj. 7022)
(ASD TR 61-475)
Unclassified report

DESCRIPTORS: *Hydrogen - Adsorption, *Ions - Ionization. Platinum, Electrodes, Electric potential, Anodes (Electrolytic cell), Electrolytes, Additives, Inorganic substances, Acids, Hydrogen compounds, Bromides, Hydrochloric acid, Perchloric acid, Sulfuric acid, Controlled atmospheres, Oxygen, Nitrogen.

Investigation of the anion influence on the shape of the current potential curves of the ionization of absorbed H on Pt. The curves were measured with the potentiostatic method of applying a triangular voltage. Determination of the adsorption isotherms and the differential heat of H adsorption in dependence upon the coverage and the anions. Study of the change of the surface state with time after the anodic activation on Pt. Influence of different additions to inorganic acids on the current potential curves of H ionization and H adsorption on Pt. (Author)

AD-277 228 Div. 4, 17
(TISTM/JSM) OTS price $4.60

Watertown Arsenal, Mass.
RECOMMENDED METHODS OF THE PANEL ON METHODS OF

ANALYSIS.
Rept. on Metallurgical Advisory Committee on Titanium.
8 June 62, 46p. incl. illus. refs. (Information bull. no. T8, pt. 3)

Unclassified report

DESCRIPTORS: *Titanium - Quantitative analysis, *Titanium alloys, *Niobium, *Tantalum, *Hydrogen - Determination, *Oxygen. Gravimetric analysis, Chemical analysis, Gases.

DETERMINATION OF Nb AND Ta IN Ti ALLOYS BY THE ION EXCHANGE-CUPFERRON GRAVIMETRIC METHOD: The method is based on that of Hague and Machlan (J. Research Nat. Bur. Standards 62:53, 1959). HOT EXTRACTION METHOD FOR DETERMINING H IN Ti METAL AND ALLOYS: Samples, contained in a Mo crucible in a vacuum system, are subjected to induction heating to remove H which is transferred from the heating zone by a high-speed Hg diffusion pump to a suitable calibrated volume. The pressure in this volume is measured with a McLeod gage to determine the amount of H. INERT-GAS FUSION METHOD FOR DETERMINING O IN Ti METAL AND ALLOYS BY THE Pt-FLUX TECHNIQUE: This method is based on the fusion of the metal sample and flux, 1 part of sample + 10 parts of Pt + 1 part of Sn in a graphite crucible under an inert atmosphere of Ar. The O in the metal reacts with C to form CO. The effluent gases are swept through iodine pentoxide to quantitatively convert the CO to CO2. The free I is removed by sodium thiosulfate. The gas mixture is finely dispersed into a solution of Ba(OH)2 and BaCO3 is formed. The change in conductivity is a measure of the O content of the sample. VACUUM FUSION METHOD FOR O (AND H) BY THE Pt-FLUX TECHNIQUE: The method is based on the technique of Hansen, Mallett, and Trzeciak (Anal. Chem. 31:1237-1241, 1959).

AD-277 394 Div. 4
(TISTM/EJH) OTS price $3.60

Milan U. (Italy).
CATHODIC REDUCTION OF OXYGEN AND HYDROGEN PEROXIDE ON PLATINUM, PALLADIUM AND IRIDIUM SMOOTH ELECTRODES,
by G. Bianchi, F. Mazza, and T. Mussini. Dec 61, 36p. incl. illus. tables, 23 refs. (Technical note no. 6)
(Contract AF 61(052)260)
(AFOSR-2050) Unclassified report

DESCRIPTORS: *Electrochemistry, *Oxygen - Reduction, *Hydrogen compounds, *Peroxides. Polarization, Oxidation, Electrodes, Cathodes (Electrolytic cell), Catalysts, Platinum, Palladium, Iridium, Surfaces, Adsorption, Decomposition, Catalysis, Solutions, Mathematical analysis, Free radicals.

Polarization curves in acid, neutral and alkaline solutions were drawn by potentiostatic method, for O and H2O2 reduction processes and for H2O2 oxidation process, on Pt, Ir and Pd electrodes. These curves could be classified as follows: those whose slopes are 0.030 to 0.12, and those with slopes higher than 0.12. The former can be explained through already proposed mechanisms (addition of one electron or one atom of H to an adsorbed O molecule; or addition of one electron to an HO2 adsorbed radical). The slopes higher than 0.12 involve a slow O or HO2 radical adsorption which becomes kinetically determining first of all for Ir in both acid and neutral solutions. For Pd in H2SO4 solution and for Pt in HCl solution the O adsorption process is very slow, essentially due to the complexing action of the solution with resulting formation of surface complexes which engage the metal atoms, thus preventing or reducing the formation of adsorbed oxide. (Author)

AD-277 412 Div. 4, 20, 2
(TISTM/EJH) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
COCRYSTALLIZATION OF ULTRAMICRO QUANTITIES OF ELEMENTS WITH 2-MERCAPTOBENZIMIDAZOLE. DETERMINATION OF GOLD IN SEA WATER,
by H. V. Weiss and M. G. Lai. 11 May 62, 16p. incl. illus. tables, 12 refs. (Rept. no. NRDL TR 564)

Unclassified report

DESCRIPTORS: *Gold, *Metalorganic compounds, *Chemical analysis, *Sea water, *Crystallization. Thiols, Benzimidazoles, Complex compounds, Metallic compounds, Tracer studies, Radioactive isotopes, Labeled substances, Quantitative analysis, Determination, Hydrogen ion concentration.

The cocrystallization of ultramicro quantities of 25 diverse elements with 2-mercaptobenzimidazole was investigated with the aid of radio-tracers. Under optimum conditions Sn, Hg, Ag, Ta and Au were recovered in high yield. Distribution coefficients between mother liquor and solid phase were calculated for gold and were found to vary inversely with the degree of crystallization and the hydrogen ion concentration. The cocrystallization process was applied to the isolation and subsequent determination of the natural gold abundance in sea water. After radiometric correction for chemical yield, the concentration of gold was calculated to be 0.068 ± 0.003 micro g/l. (Author)

AD-277 435 Div. 4
(TISTM/EJH) OTS price $2.60

Washington U., Seattle.
SOME REACTIONS OF BIS(PENTAFLUOROSULFUR) PEROXIDE,
by Claude E. Merrill and George H. Cady. 1962, 24p. incl. illus. tables, 15 refs. (Technical rept. no. 35)
(Contract Nonr-47716)

Unclassified report

DESCRIPTORS: *Peroxides, *Fluorides - Chemical reactions, *Sulfur compounds. Methanes, Ethylenes, Methyl radicals, Sulfonyl radicals, Dioxides, Sulfonates, Sulfates, Physical properties, Infrared spectroscopy, Mass spectroscopy, Nuclear magnetic resonance, Oxidation, Substitution reactions, Nitrogen compounds, Oxides, Chlorides, Synthesis.

Reactions between bis(pentafluorosulfur) peroxide and NO, CF2C12, C2F4, CF3OOCF3, S2O6F2, SO2 and SF4 were observed. It was found that bis(pentafluorosulfur) peroxide acts to introduce sulfur oxide pentafluoride groups into molecules by substitution and oxidative addition. Side reactions often occur. These side reactions include the decomposition of the peroxide into simpler products and also include oxygenation and, occasionally, fluorination. The new substances, SF5OCF3, SF5SF5OOSO2F, (SF5)2SO4 and cis-(SF5O)2SF4, were characterized. A new method for the synthesis of SF5OSO2F was found and properties of the compound were determined. (Author)

AD-277 441 Div. 4, 27, 10
(TISTM/EJH) OTS price $5.60

Aerospace Corp., El Segundo, Calif.
PROPULSION RESEARCH PROGRAM. HYDRIDE AND FLUORIDE INVESTIGATIONS, PART II. FLUORIDE INVESTIGATIONS.
Semiannual technical rept., 1 July-31 Dec 61, by Richard Tunder and Bernard Siegel. 9 Feb 62,

48p. incl. table, 158 refs. (Rept. no. TDR-930 (2210-12)TR-1, pt. 2)
(Contract AF 04(647)930)
(DCAS TDR 62-4) Unclassified report

DESCRIPTORS: *Fluorides - Synthesis, *Oxyfluorides, *Sulfur compounds, *Nitrogen compounds. Quaternary amines, Bibliography, Selenium compounds, Tellurium compounds, Metal-organic compounds, Complex compounds, Nitroso radicals, Naphthyl radicals, Hydroxides, Chemical reactions, Fluorination, Purification, Hydrides, Rocket oxidizers, Rocket propulsion.

The work reported consisted mainly of experiments designed to prove the existence of the model compound R4N+SF5-, prepared by reaction of SF4 with R4N+F- at low temperatures. Stoichiometric determinations as a function of time indicated the formation of a 1:1 complex. Further, the IR spectrum indicated that the product contained the R4N+ cation and that a new compound was formed. However, the results were obscured by the presence of considerable quantities of SOF2 and SiF4 in the SF4 reagent; it is possible that HF or lower fluorides were also present. A practical method for purification of SF4 was worked out. A preliminary fluorination of an organo-nitroso compound with SF4 at high pressure and temperature was performed. Identification of the products was not accomplished. A detailed literature survey of the fluorides and oxyfluorides of sulfur, selenium, and tellurium was prepared and used in the formulation of the F program. (Author)

AD-277 494 Div. 4, 25
(TISTM/EJH) OTS price $1.25

Monsanto Research Corp., Dayton, Ohio.
ORGANIC SEMICONDUCTORS.
Final rept., 1 May 61-30 Apr 62,
by B. S. Wildi and E. R. Biehl. 15 May 62, 39p. incl. illus. tables, 20 refs. (Rept. no. MRC DA-3)
(Contract AF 19(604)8497, Proj. 4769)
(AFCRL 62-600) Unclassified report

DESCRIPTORS: *Semiconductors - Synthesis, *Organic compounds - Synthesis, *Anthracenes, *Benzenes, *Quinones, *Triazines, *Complex compounds. Phthalic acids, Nitriles, Amines, Cyano radicals, Iodine, Single crystals, Growth, Polymers, Purification, Impurities, Crystal structure, Electrical properties.

The synthesis, purification and single crystal growth of coronene, perylene/iodine complex and chloranil/durenediamine complex are discussed. The usual purification methods of organic chemistry, namely, chromatography, recrystallization, sublimation and zone refining where applicable, were employed. Purification of coronene contaminated with 1:12-benzoperylene-1:12-C-14 (11,000 ppm) and coronene 1:2-dicarboxylic-1:2-C-14 anhydride (15,000 ppm) reduced the impurity concentration to 57 and 0.25 ppm, respectively. Attempted analytical methods for determination of trace impurities in the above compound are described. IR, UV and fluorescence spectra apparently cannot determine impurity levels of the order of 1 ppm. X-ray analysis of coronene crystals, perylene/iodine crystals, and chloranil/durenediamine crystals revealed considerable strains and distortions. The electrical properties of the single crystals of the above semiconductors are described. Polymers of 2,4,6-tricyano-s-triazine and terephthalonitrile were prepared and shown to be semiconductors. (Author)

5. COMMUNICATIONS

AD-277 009 Div. 5
(TISTE/CAM) OTS price $1.60

General Dynamics/Electronics, Rochester, N. Y.
FORMANT VOCODER SPEECH COMPRESSION SYSTEM (EXPERIMENTAL MODEL).
Quarterly progress rept. no. 2, 1 Oct-31 Dec 61, by L. C. Stewart. 31 Dec 61, 10p. incl. illus.
(Contract DA 36-039-sc-87252, Proj. 3B31-07-001)
Unclassified report

DESCRIPTORS: *Speech, *Speech transmission, *Voice communication systems. Data processing systems, Digital systems, Circuits, Multiplex transmission, Coding, Design.

Design of the experimental model of the Formant Vocoder continued, and the construction phase was initiated. The design of the demultiplex was essentially completed; the design of a transistorized synthesizer was begun; the maximum amplitude selector was redesigned. (Author)

AD-277 026 Div. 5
(TISTW/RD) OTS price $22.25

Motorola, Inc., Chicago, Ill.
COMMUNICATION SYSTEM AN/USC-3(V) DEVELOPMENT PROGRAM. VOLUME 1. TECHNICAL DEVELOPMENT.
Final rept., 10 Aug 59-26 Feb 62,
by E. M. Beard, A. M. Boothe and others.
26 Feb 62, 396p. incl. illus. tables.
(Contract DA 36-039-sc-85302)
Unclassified report

DESCRIPTORS: *Radio communication systems. Communication equipment, Very high frequency, Multiplex transmission, Facsimile communication systems, Facsimile transmission, Voice communication systems, Teletype systems, Sidebands, Military communications, Mobile, Switching circuits, Test equipment, Power supplies, Antennas, Radio receivers, Radio transmitters, Packaging, Amplifiers.

Contents:
System interrelated circuits
Central station design
Communications central AN/MSC-37
Subscriber station design
Radio test set AN/GRM-49 design
Central station performance data

AD-277 112 Div. 5, 8
(TISTE/CRJ) OTS price $8.10

Temco Electronics, Dallas, Tex.
LOW LEVEL TRANSMITTER-EXCITER.
Final rept.
Oct 61, 1v. incl. illus.
(Contract FAA/BRD-268)
Unclassified report

DESCRIPTORS: *Radio transmitters, *Radio telephones, *Crystal oscillators. Amplitude modulation, Very high frequency, Ultra high frequency, Power amplifiers, Audiofrequency, Modulation, Coupling circuits, Modulators, Low pass filters, Power supplies, Radio interference, Reduction, Radiofrequency oscillators, Operation.

The development is presented of 8-watt, amplitude-modulated, single-channel radio-telephone transmitters capable of operation in the VHF and UHF ranges. The single channel crystal-controlled transmitter can be set to any desired frequency in the range of 118 to 152 mc (TV-24) and

225 to 400 mc (TU-5). The transmitters may be operated either as a low-powered transmitter or as exciters capable of driving a high-powered linear amplifier. The transmitter circuitry involves specialized packaging of conventional transmitter components, an audio-modulator, a directional coupler, and a low-pass filter. The transmitters are designed for the attainment of high operational stability, long operating life, ease of maintenance and reduced cross-modulation. The transmitter-exciters exhibit VHF stability. Frequency stability for the TV-24 is .00015% and the TU-5 stability is .00013%. Two major development goals were achieved: (1) the reduction of cross-modulation products by use of low-level modulation and linear amplification, and (2) the development of compact accessible assemblies which take advantage of the latest advances in the state-of-the-art. The complete unit occupies only 3 1/2 inches of vertical panel height and requires no forced air cooling. (Author)

AD-277 117 Div. 5, 2
(TISTP/JW) OTS price $2.60

Woods Hole Oceanographic Institution, Mass.
TELEMETERING CURRENT METER,
by Robert M. Synder and Edward H. Chute.
June 62, 8p. incl. illus. (Reference no. 62-21)
(Contract Nonr-335100, Proj. NR 083-501)
Unclassified report

DESCRIPTORS: *Telemetry systems, *Ocean currents, *Data transmission systems. Corrosion inhibitors, Pressure regulators, Transducers, Oceanographical data.

AD-277 176 Div. 5
(TISTE/CDM) OTS price $21.00

Hughes Aircraft Co., Culver City, Calif.
SURVEY OF DIGITAL COMMUNICATIONS.
Rept. on 480L System,
by C. A. Deutschle. 15 Apr 61, 386p. incl. illus. tables, 7 refs. (Rept. no. TR-1)
(Contract AF 19(626)5; Subcontract to ITT Communication Systems, Inc., Paramus, N. J.)
(ESD TDR 62-158)
Unclassified report

DESCRIPTORS: *Data transmission systems, *Digital systems, *Air force communications, *Communication systems, *Wave transmission. Facsimile transmission, Speech transmission, Errors, Cryptography, Television communication systems, Speech representation, Ionospheric propagation, Processing, Handbook.

Contents:
Discrete message types and their characteristics
Basic message considerations, alpha-numerical messages, and discrete signals from continuous sources
Transmission requirements and techniques
Synchronization, cryptography, message conversions, and message storage
Transmission media (Types of propagation)
Conductive, ground wave, line-of-sight, ionospheric reflection and scatter, tropospheric scatter, meteoric scatter, atmospheric duct
Discrete transmission links
Discrete link terminals and configurations
Error control
Channel considerations, tolerable residual errors, noise and error statistics, error control methods, conclusions and AIRCOM implications
Traffic handling - Processing and routing
Comparative evaluations - Significant parameters, trade-offs and compromises, and AIRCOM application

AD-277 422 Div. 5
(TISTB/MS) OTS price $2.60

Michigan U., Ann Arbor.
THE MEASUREMENT OF FUNCTIONAL LOAD,
by William S.-Y. Wang and James W. Thatcher.
Apr 62, 30p. 16 refs. (Rept. no. 8)
(Contract AF 49(638)492)
(AFOSR-2092)
Unclassified report

DESCRIPTORS: *Communications theory. Language, Speech, Speech representation, Measurement.

The concept of functional load is traditionally used to quantify ''extent of contrast'' among a set of phonemes. An attempt is made to associate with the concept a precise meaning within the framework of communication theory. It is suggested that any definition of functional load which conforms to the traditional usage of the concept must satisfy at least the five conditions given in this paper. The definitions of functional load given by Greenberg and Hockett, as well as several other possible definitions, are examined with respect to these conditions. Some empirical consequences of this line of investigation are discussed. (Author)

AD-277 457 Div. 5
(TISTB/AW) OTS price $10.50

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
AN EVALUATION OF SPEECH COMPRESSION SYSTEMS.
Interim rept.,
by Kenneth N. Stevens, Michael H. L. Hecker, and Karl D. Kryter. 1 Mar 62, 1v. incl. illus. tables, 55 refs. (Rept. no. 914)
(Contract AF 30(602)2235, Proj. 4519)
(RADC TDR 62-171) Unclassified report

DESCRIPTORS: *Voice communication systems - Analysis, *Military communications - Voice communication systems. Speech transmission, Intelligibility, Low pass filters, Narrowband.

The results of PB word and nonsense syllable intelligibility tests, voice quality, talker identification, and continuous speech tests of selected speech compression systems are presented. The systems were: a reference low-pass (approximately 3000 cps) filter system, two channel vocoders, a semi-vocoder, a formant-tracking vocoder and a multiple narrow band filter system. Different speech compression techniques are classified according to their ability to provide a given level of speech intelligibility at different information rates. Channel vocoders operating at about 2400 bits/sec and semi-vocoders at an estimated 9600 bits/sec provide adequate intelligibility and quality for most military communications; the quality of the semi-vocoder is superior to the channel vocoder. Formant-tracking vocoders utilize the lowest information rate (about 1000 bits/sec) of any of the bandwidth compression techniques. Formant-tracking vocoders require further improvement before they can be as satisfactory for general use. (Author)

6. DETECTION

AD-277 054 Div. 6
(TISTW/RD) OTS price $2.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
TESTING CHAFF,
by John E. Bloomhuff and Roger L. Grossel.
May 62, 25p. incl. illus. (Rept. no. APGC TDR 62-28)
Unclassified report

DESCRIPTORS: *Radar confusion reflectors. Release mechanisms, Photography, Tests, Test methods, Radar reflections, Radar echo areas, Radar interference, Data processing systems.

Video recording, pulse-to-pulse photography, and frame-type photography integrating several pulses are used at the APGC to obtain data on chaff bloom history, rate of fall, and dispersion rate. Breaklock effectiveness of the complete chaff system can be evaluated simultaneously. Basic instrumentation requirements, calibration procedures, and project planning data are given for collection of data by ground radars. Time Space Position Information can be used to point the antennas of the victim radars. Calibration of radars provides absolute value of chaff reflectivity, independent of the measuring radar. An airborne system provides measurements to approximately 70 feet of chaff-to-aircraft separation. Visual photography of the space immediately aft of the dispensing aircraft indicates the exact number of chaff units dispensed and opened. Data reduction and analysis considerations are included. (Author)

AD-277 156 Div. 6, 2, 20
(TISTP/JW) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
FLIGHT-TYPE FARADAY CUP DETECTOR.
Semiannual technical rept., 1 July-31 Dec 61 on Space Physics Program,
by F. S. Mozer, A. Lawrence, and G. S. Gayron.
30 Mar 62, 34p. incl. illus. tables, 14 refs.
(Rept. no. TDR-930(2260-23)TR-1)
(Contract AF 04(647)930)
(DCAS TDR 62-85) Unclassified report

DESCRIPTORS: *Space environmental conditions, *Detectors, *Fluxmeters. Protons, Electrons, Energy, Particles, Radiation hazards, Scintillation counters, Photomultipliers, Amplifiers.

The design, development, and flight of a Faraday cup detector to measure the flux and energy spectrum of the low energy protons and electrons in the near earth environment are described. The near earth region of space contains high fluxes of electrons and protons having energies of between a few hundred and several hundred million electron volts. The lower energy portion contains the largest flux of particles with typical energies of 1 to 50 or 100 kilovolts. These fluxes can produce heavy damage to surface or exposed internal components in a satellite system. In addition, although of considerable scientific interest, little is known about the source of these particles in the Van Allen radiation belts and the auroral zones or the decay processes that lead to the loss of these particles. For these scientific and military reasons, the Faraday cup detector work was conducted. The detector consists of two Faraday cups, a scintillation crystal, photomultiplier, amplifier, high voltage supply, and collector electronics. (Author)

AD-277 294 Div. 6, 22
(TISTW/EET) OTS price $2.60

Army Arctic Test Board, Fort Greely, Alaska.
SERVICE TEST OF TELESCOPE, OBSERVATION, PERISCOPIC, T-9.
1 June 62, 19p. incl. illus. tables, 8 refs.
(Proj. no. ATB 1-72)
Unclassified report

DESCRIPTORS: *Telescopes, *Periscopes. Optical instruments, Optical equipment, Binoculars, Theodolites, Periscope mounts, Periscopic gun sights, Optical sights, Azimuth, Containers, Arctic regions, Test methods, Tests, Maintenance, Reliability, Military requirements.

Tests were conducted to determine the suitability of the Observation, Periscopic, Telescope, T-9 for Army use under arctic winter conditions. The test telescope is a periscopic binocular theodolite with selective magnification of 10 or 20 power. It was concluded that the telescope should be suitable for Army use under arctic winter conditions when the deficiencies, and as many of the shortcomings as practicable are corrected. (Author)

AD-277 395 Div. 6, 19
(TISTW/RD) OTS price $2.60

Office of Research Administration, U. of Michigan, Ann Arbor.
CONSIDERATIONS IN THE AUTOMATION OF A SPINNING-GONIOMETER RADIO DIRECTION FINDER,
by W. J. Lindsay and D. S. Heim. Feb 61, 21p. incl. illus. 5 refs. (Technical memo. no. 85; 2899-47-T)
(Contract DA 36-039-sc-78283, Proj. 3A99-06-001-01)
Unclassified report

DESCRIPTORS: *Goniometers, *Direction finding - Automation. Narrowband, Synchronizers, Automatic, Radio equipment, Feasibility studies, Frequency shift keyers, Bearing finding, Sensitivity, Navigation computers.

Some aspects of instrumentation design are discussed in making a spinning-goniometer radio direction finder essentially automatic in operation. Also discussed is the application of narrowband synchronous post-detection filtering for improving the bearing sensitivity. (Author)

7. ELECTRICAL EQUIPMENT

AD-277 018 Div. 7, 4
(TISTM/BRW) OTS price $4.60

Politecnico di Milano (Italy).
RESEARCH ON HYDROGEN OVERVOLTAGE ON METALLIC SINGLE CRYSTAL.
Interim rept. for 1 July 60-30 June 61 on Surface and Interface Phenomena of Matter,
by R. Piontelli, L. Peraldo Bicelli, and A. La Vecchia. Mar 62, 36p. incl. illus. tables, 29 refs.
(Contract AF 61(052)144, Proj. 7022)
(ASD TN 61-158) Unclassified report

DESCRIPTORS: *Antimony, *Bismuth, *Zinc, *Electrodes - Polarization, *Single crystals - Electrochemistry. Hydrogen, Voltage, Electrolytic cells, Metallic crystals, Crystals, Electrolytes, Hydrochloric acid, Perchloric acid, Cathodes (Electrolytic cell).

Hydrogen overvoltage on Zn, Bi, and Sb single crystals has been measured in different experimental conditions. Tafel law is generally followed. Comparisons are made with the results previously obtained on other single crystal electrodes. (Author)

AD-277 042 Div. 7, 12
(TISTA/SEB) OTS price $2.60

RCA Industrial Tube Products, Lancaster, Pa.
THE DEVELOPMENT OF AN AUXILIARY ELECTRODE THERMIONIC CONVERTER.
Quarterly technical rept. no. 1, 15 Jan-30 Mar 62,
by F. G. Block and J. J. O'Grady. Apr 62, 17p. incl. illus. table.
(Contract AF 33(657)8005, Proj. 3145)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Power supplies - Space flight, *Solar cells. Heat, Energy, Ionization, Design, Effectiveness, Triodes, Electrodes, Life expectancy, Thermionic emission, Cathodes, Anodes, Cesium, Generators.

The efficiency and life expectancy of thermionic energy converters for space applications were studied. The objective of the program is to determine the feasibility and to demonstrate the practicality of a three-electrode thermionic converter having a third, positive ion-producing electrode, an efficiency of not less than 15%; an unattended life of not less than one year; and a maximum temperature of 1500 Kelvin. An approach using impact ionization will be pursued. (Author)

AD-277 108 Div. 7, 26
(TISTM/EJH) OTS price $5.60

Sprague Electric Co., North Adams, Mass.
INDUSTRIAL PREPAREDNESS MEASURES ON SOLID ELECTROLYTE BATTERY BA-388( )/U.
Final rept., 1 Jan 59-31 Dec 61,
by W. F. Bell and A. G. Ceely. 31 Dec 61, 1v. incl. illus. tables.
(Contract DA 36-039-sc-81251)
Unclassified report

DESCRIPTORS: *Primary batteries - Manufacturing methods, *Dry cells. Industrial production, Automation, Quality control, Design, Seals, Cathodes (Electrolytic cell), Extrusion, Materials, Containers, Production, Solids, Electrolytes.

Technical and operational problems encountered in achieving the purposes of the contract are described. In particular, problems of low production yields and their eventual solutions are discussed. A major step in improvement of finished battery yields was the replacement of the brass outer case by an epoxy resin covering that enhanced the ease of assembly and reduced the danger of shorting. Other problems encountered included determining the design of the silver shell to serve as container for the individual cells, determining the design of the seal and lead assembly for the cells, and accelerating, and improving the control of, the cathode extrusion step of the process. Results of preproduction qualification tests are presented. The process and process control steps in manufacturing the battery are described. (Author)

AD-277 114 Div. 7, 8
(TISTE/BRW) OTS price $8.60

Chicago Telephone Supply Corp., Elkhart, Ind.
CERMET ELEMENT RESISTOR REFINEMENT PROGRAM.
Final technical engineering rept., 19 Oct 59-31 Mar 62,
by J. DiGirolamo, R. J. Masten and others.
Apr 62, 83p. incl. illus. tables.
(Contract AF 33(600)40125, Proj. 7-737)
(ASD TR 62-7-737) Unclassified report

DESCRIPTORS: *Variable resistors. Resistors, Cermets, Design, Tests, Production, Manufacturing methods, Tools, Materials.

A line of cermet element variable resistors meeting the size requirements of Mil-R-94B Styles RV4, RV5, and RV6, but with higher performance specifications including full load rating at 125 C and no load rating at 275 C, was designed and produced. (Author)

AD-277 171 Div. 7, 4
(TISTM/EJH) OTS price $5.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
NEW CATHODE-ANODE COUPLES USING NONAQUEOUS ELECTROLYTES.
Final rept., Mar 61-Nov 61,
by J. E. Chilton, Jr. Apr 62, 53p. incl. illus. tables, 18 refs.
(Contract AF 33(616)7957, Proj. 8173)
(ASD TDR 62-1) Unclassified report

DESCRIPTORS: *Solar cells - Materials, *Storage batteries, *Power supplies - Satellite vehicles. Electrolytes, Electrolytic cells, Cathodes (Electrolytic cell), Anodes (Electrolytic cell), Electrodes, Aluminum electrodes, Alkali metals, Alkaline earth metals, Copper compounds, Metallic compounds, Salts, Solutions, Organic solvents, Conductivity, Electrochemistry, Lithium, Aluminum, Containers.

New anode-cathode couples using nonaqueous solvents were investigated for use as secondary batteries for power sources in orbiting satellites. Reversibility of anode and cathode reactions in nonaqueous media was studied by measuring the current efficiency for metal deposition or dissolution as a function of current density. At densities of 20 ma/sq cm, Mg from a Mg ethyl bromide-ethyl ether solution, K from a POCl3-KI system, Al from an AlCl2-n hexylamine-ethyl ether system showed low reversibility. High current efficiences were found for Li electrodeposition from a propylene carbonate Li salt system and for an AlCl3-ethyl pyridinium bromide-toluene system at 20 ma/sq cm current density. After anodic oxidation of many metals, NiCl2 and AgCl were insoluble in the propylene carbonate system; NiCl2 was insoluble in the AlCl3-ethyl pyridinium bromide-toluene solution. (Author)

AD-277 197 Div. 7
(TISTM/BRW) OTS price $1.75

Radio Corp. of America, Somerville, N. J.
EVALUATION OF NEW CATHODE-ANODE COUPLES FOR SECONDARY BATTERIES.
Final rept., June 60-Oct 61 on Energy Conversion Technology,
by E. F. Uhler and G. S. Lozier. Apr 62, 53p. incl. illus. tables, 49 refs.
(Contract AF 33(616)7505, Proj. 3145)
(ASD-TDR 62-4) Unclassified report

DESCRIPTORS: *Wet cells, *Storage batteries, *Anodes (Electrolytic cell), *Cathodes (Electrolytic cell). Materials, Alkali metals, Alkaline earth metals, Aluminum, Electrolytes, Battery separators, Ceramic materials, Salts, Chlorides, Battery compartments, Design, Melting.

A general approach for the selection of promising anode and cathode materials for high-capacity secondary batteries is presented. The most promising anode materials were shown to be the alkali, alkaline-earth metals, and aluminum materials. This was on the basis of ampere-hour capacity and theoretical EMF. The deductions leading to a non-aqueous electrolyte, specifically a molten salt electrolyte, are described. The limitations placed on the cathode materials

by the anode and cathode materials are discussed. The most promising cathode materials were shown to be the inorganic oxides and the metal halides (metal-metal ion electrodes) which are stable at high temperatures. A classification of cathode-anode couples, based on methods of separation, is developed. The most promising method of separation is based on materials which permit single-ion mobility. Certain ceramic materials, in which sodium ions are mobile, are described. (Author)

AD-277 223 Div. 7, 25
(TISTM/EJH) OTS price $5.60

Westinghouse Electric Corp., Pittsburgh, Pa.
THERMOELECTRICITY.
Quarterly progress rept. no. 2, 1 July-1 Oct 61. 1 Oct 61, 56p. incl. illus. refs.
(Contract NObs-84687)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Semiconductors - Conductivity. Materials, Intermetallic compounds, Alloys, Germanium compounds, Silicon compounds, Germanium alloys, Silicon alloys, Bismuth compounds, Antimony compounds, Tellurium compounds, Conductors, Crystals, Bismuth alloys, Antimony alloys, Tellurium alloys, Electrical properties, Solid state physics, Transport properties, Theory, Thermal conductivity.

This report includes:
LATTICE THERMAL RESISTANCE AT NORMAL AND HIGH TEMPERATURES DUE TO POINT DEFECTS, by P. G. Klemens. 11 Dec 61 (Research rept. no. 929-8904-R3)

COMMENTS ON "THERMAL CONDUCTIVITY IN TWO-PHASE ALLOYS," by R. W. Ure, Jr. 29 Nov 61, (Scientific paper no. 929-8904-P6)

THERMOELECTRIC EFFECTS IN NON-LINEAR JUNCTIONS, by R. W. Ure, Jr. 26 Oct 61 (Scientific paper no. 929-8904-P5)

AD-277 224 Div. 7
(TISTM/EJH) OTS price $7.60

Westinghouse Electric Corp., Pittsburgh, Pa.
AN INVESTIGATION OF SOLID ELECTROLYTE FUEL CELLS.
Quarterly technical progress rept. no. 1,
by D. H. Archer, W. G. Carlson and others. 1959, 76p. incl. illus. tables (Rept. no. BPS 2-3-3145-60813-17)
(Contract AF 33(657)8251)
Unclassified report

DESCRIPTORS: *Power supplies, *Fuel cells - Materials, *Dry cells. Electrolytic cells, Electrolytes, Electrodes, Ceramic materials, Zirconium compounds, Calcium compounds, Oxides, Design, Conductivity, Electrical properties, Gold, Molybdenum compounds, Sulfides, Space environmental conditions, Thermodynamics, Feasibility studies, Solids.

Contents:
Electrolyte development and evaluation
  Preparation
  Electrical characteristics (Resistivity, Ionic conductivity, Cation mobility, Electrolyte stability)
Electrode development
  Electrode materials survey
  Application
  Performance
Cell development
  Flat plate cell tests
  Segmented tube fuel cell tests
Cell design studies - optimization of cell power density
  Flat plate cells
  Segmented tube fuel cell
Operation of solid electrolyte fuel cells at high altitudes
Appendix I. Power density optimization of a flat plate fuel cell
Appendix II. Power density optimization of a segmented tube fuel cell

AD-277 257 Div. 7
(TISTP/JW) OTS price $4.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
END LOSSES IN MAGNETOHYDRODYNAMIC CHANNELS WITH TENSOR ELECTRICAL CONDUCTIVITY AND SEGMENTED ELECTRODES,
by George W. Sutton. Mar 62, 27p. illus. 7 refs.
(Rept. no. R62SD35)
(Contract AF 49(638)914)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Generators. Tensor analysis, Viscosity, Conductivity, Fluid flow, Magnetic fields, Hall effect, Electrodes, Power plants.

End losses of an inviscid magnetohydrodynamic channel having tensor conductivity and segmented electrodes were calculated for a magnetohydrodynamic power generator of this geometry. It was found that the constant-current configuration is more efficient than the constant potential difference case. The efficiencies increase with increasing Hall effect, but constant magnitude extensions to the magnetic field have very little effect. (Author)

AD-277 260 Div. 7
(TISTW/EET) OTS price $7.60

Electronics Research Lab., U. of Calif., Berkeley.
SATURATING SERVOMECHANISM TO FOLLOW A RANDOM PROCESS,
by P. Govaerts. 14 Sep 61, 65p. incl. illus. 21 refs. (Scientific rept. no. 8; Series no. 60, Issue no. 405)
(Contract AF 19(604)5466, Proj. 5632)
(ARCRL 62-102) Unclassified report

DESCRIPTORS: *Servomechanisms, *Control systems. Mathematical prediction, Feedback, Probability, Vector analysis, Statistical processes, Statistical functions, Real variables, Matrix algebra, Integral equations, Time, Costs.

Solutions to the problem of obtaining the optimal bounded input to a servomechanism which must follow a discrete-time random process are given in the case of a first order system. If the random process is a finite Markov chain, solutions can be obtained for any servomechanism with finite state vector, with each component having only a finite range. The cost function is any function of the state and of the control, which is restricted to a finite set of values. The generalizations of these problems can be done in various directions. Keeping the assumptions of a discrete-time random process $x(t)$ and the form of the cost functional, which both make sense in engineering applications, a first extension would be to consider servomechanisms of order greater than one, in the cases of independent and of Markov dependent random variables. As a further extension, the cost functional could include a function of the control itself, instead of depending only on the error. In the finite case, when the inputs and the servomechanism take values in finite sets only, the problem is theoretically solved by application of the minimization procedure in a product

space of sufficiently high dimensions. However, this becomes rapidly numerically unworkable as the number of variables increases. How to reduce the dimensionality of the problem is then worth a careful investigation. (Author)

AD-277 350 Div. 7
(TISTM/REB) OTS price $9.60

New York State Coll. of Ceramics, Alfred U.
FUEL CELL BIBLIOGRAPHY.
15 June 62, 116p.
(Contract AF 33(657)7564)
Unclassified report

DESCRIPTORS: *Fuel cells - Bibliography, *Bibliography - Fuel cells.

References in this bibliography on fuel cells are arranged alphabetically by the authors. References for which no author is cited are arranged alphabetically by title under the general heading, Anon. The numerous references cover the time period of 1895 to 1961.

AD-277 366 Div. 7, 26
(TISTW/DLW) OTS price $16.00

Electra Mfg. Co., Kansas City, Mo.
PRODUCTION REFINEMENT OF HIGH STABILITY FIXED FILM RESISTORS.
Final technical engineering rept., 20 Sep 57-8 Sep 61,
by William E. McLean, Gaylord A. Swartz and others. Oct 61, 231p. incl. illus. tables, refs.
(Contract AF 33(600)36090)
(ASD TR 62-7-603) Unclassified report

DESCRIPTORS: *Fixed resistors, *Thin films, *Vapor plating, *Manufacturing methods. Stability, Processing, Metal films, Vacuum systems, Chromium alloys, Titanium alloys, Nitrides, Evaporation, Cleaning, Adhesion, Heat treatment.

High stability Chromium-Titanium-Nitride resistors were produced by high vacuum evaporation of Chromium-Titanium alloys on carefully cleaned alumina substrates, nitriding the evaporated film at 1000 C, and heat treating the nitrided film at 350 C. (Author)

AD-277 368 Div. 7
(TISTP/TL) OTS price $1.60

Electronics Research Lab., U. of Calif., Berkeley.
SOME NONLINEAR SYSTEMS SATISFYING AIZERMAN'S CONJECTURE,
by I. J. Williams. 12 Oct 61, 16p. incl. illus. 6 refs. (Scientific rept. no. 10; Series no. 60, Issue no. 410)
(Contract AF 19(604)5466, Proj. 5632)
(AFCRL 62-168) Unclassified report

DESCRIPTORS: *Nonlinear systems - Stability, *Control systems - Analysis, *Special functions, *Transformations (Mathematics). Integral equations, Vector analysis, Linear systems, Differential equations, Time, Matrix algebra, Sequences, Polynomials, Inequalities, Functions, Real variables.

This analysis summarizes the types of first, second and third order nonlinear systems for which Aizerman's conjecture (concerning the use of a linearized model to determine sufficient conditions for stability) has been verified. These systems are described in terms of their block diagram representations, and through the use of block diagram transformations these systems are extended to cover larger classes of systems. Systems containing an equal number of poles and zeros are included by placing restrictions upon the derivative of the nonlinear function. (Author)

AD-277 369 Div. 7
(TISTP/TL) OTS price $1.60

Electronics Research Lab., U. of Calif., Berkeley.
VERIFICATION OF AIZERMAN'S CONJECTURE FOR A CLASS OF 3RD ORDER SYSTEMS,
by A. R. Bergen and I. J. Williams. 12 Oct 61, 16p. incl. illus. 10 refs. (Scientific rept. no. 9; Series no. 60, Issue no. 409)
(Contract AF 19(604)5466, Proj. 5632)
(AFCRL 62-103) Unclassified report

DESCRIPTORS: *Linear systems, *Special functions, *Nonlinear systems - Stability, *Servomechanisms, *Functions. Matrix algebra, Sequences, Transformations (Mathematics), Integral equations, Differential equations, Time, Polynomials, Real variables.

Identifiers: Aizerman's conjecture, Lyapunov function.

Given a linear system with three poles and no zeros, whose equilibrium point is asymptotically stable for any linear loop gain k, such that $k_1<k<k_2$, the linear gain element can be replaced by any continuous single-valued nonlinear function $f(e)$, such that $k_1<\frac{f(e)}{e}<k_2$, and the equilibrium point of the nonlinear system will be asymptotically stable in the large. (Author)

AD-277 401 Div. 7, 4, 12
(TISTM/EJH) OTS price $2.60

Mallory, P. R., and Co., Indianapolis, Ind.
MERCURY CELL BATTERY INVESTIGATION.
Quarterly technical progress rept. no. 2, 16 Mar-15 June 62,
by J. M. Booe and R. E. Ralston. 15 June 62, 28p. incl. illus. tables.
(Contract AF 33(657)7706)
Unclassified report

DESCRIPTORS: *Storage batteries, *Power supplies - Materials, *Electrolytic cells, *Alkaline cells, *Mercury electrodes. Electrolytes, Electrodes, Anodes (Electrolytic cells), Cathodes (Electrolytic cells), Battery separators, Zinc electrodes, Silver electrodes, Satellite vehicles, Plastics, Potassium compounds, Hydroxides, Electrochemistry, Additives, Selenium compounds, Selenium, Mercury compounds, Oxides.

Improvements were made in the apparatus for determining the volume of gas generated during chemical reactivity rate studies. Preliminary specimens of the liquid anode retaining member were produced. The use of Pd in the Ag-HgO positive electrode effected a pronounced change in the behavior of this electrode. During the charging operation a more uniform voltage was maintained. Charge and discharge experiments continued. Discharge rates up to 2000 ma/sq in. were achieved at room temperature under uninhibited conditions for the negative electrode. The permissable charge rate on the positive electrode was the limiting process. Preliminary charge and discharge data were obtained at 32 F.

Considerable preliminary data were obtained on electrode separator materials. The effect of selenite in the electrolyte was studied from the standpoint of charge and discharge reactions. Cycle test data was obtained. (Author)

AD-277 433 Div. 7, 4
(TISTM/EJH) OTS price $3.60

Union Carbide Consumer Products Co., Cleveland, Ohio.
DEPOLARIZERS FOR HIGH ENERGY DENSITY THERMAL BATTERIES. PART I: COPPER OXIDE AND ANTIMONY OXIDE.
Final rept.,
by S. Senderoff, E. M. Klopp, and M. L. Kronenberg. 15 June 62, 31p. incl. illus. 18 refs.
(Contract NOrd-18240)

Unclassified report

DESCRIPTORS: *Power supplies - Electrochemistry, *Primary batteries - Electrochemistry, *Electrolytic cells, *Polarization. Additives, Copper compounds, Antimony compounds, Oxides, Electrolytes, Potassium compounds, Lithium compounds, Chlorides, Eutectics, Mixtures, Salts, Electric discharges, Electrolysis, Thermochemistry, High temperature research.

In a theoretical and experimental screening of large numbers of compounds for use as depolarizers in high energy density thermal cells, CuO and Sb_2O_3 emerged as two promising materials on the basis of their thermodynamic properties, thermal stability, and solubility and compatibility with molten chloride electrolytes. Electrochemical properties were determined by study of polarization curves and experimental cell discharge characteristics and indicate that properly designed thermal cells with these depolarizers may be suitable for a battery operating for five minutes at a power of 10 KW with an energy density of 100 watt-hrs/lb. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-277 013 Div. 8, 15
(TISTP/TL) OTS price $13.00

Johns Hopkins U. School of Engineering, Baltimore, Md.
REPRESENTATION AND ANALYSIS OF SIGNALS. PART XI. INTEGRAL TRANSFORMS AND TIME-VARYING SYSTEMS,
by Leonard Weiss. 21 May 62, 187p. 23 refs.
(Contract Nonr-24853)
Unclassified report

DESCRIPTORS: *Signals - Analysis, *Integral transforms, *Functions, *Linear systems - Theory, *Matrix algebra, *Integral equations. Time, Vector analysis, Transformation mathematics, Synthesis, Green's function, Algebra, Real variables.

The objective of this dissertation is to examine the fundamental character of the transform method within the framework of the general theory of eigenfunction expansions for linear differential operators. It is shown that the existence of an integral transform which is compatible with a given system is dependent on the existence of a purely continuous spectrum for the canonical operator associated with that system. A heuristic development of the connection between spectral theory and integral transforms is presented. The theory and application of integral transforms for the systems with second-order canonical operators are developed. The dissertation concludes with a brief discussion of a generalization of the expansion theory to systems with higher-order canonical operators. (Author)

AD-277 015 Div. 8, 15
(TISTP/TL) OTS price $9.60

Johns Hopkins U. School of Engineering, Baltimore, Md.
REPRESENTATION AND ANALYSIS OF SIGNALS. PART X. SIGNAL THEORY AND ELECTROCARDIOGRAPHY,
by Tzay Y. Young. 15 May 62, 112p. incl. illus. tables, 37 refs.
(Contracts Nonr-24853 and AF 19(604)1941)
Unclassified report

DESCRIPTORS: *Signals - Analysis, *Electrocardiography, *Information theory, *Statistical analysis, *Numerical analysis. Vector analysis, Applied mathematics, Series, Fourier analysis, Transformations (Mathematics), Integral equations, Matrix algebra, Digital computers, Analog computers, Memory devices, Data, Sampling, Dipole moments, Circuits, Electrical networks, Theory.

The purpose of this investigation is to demonstrate that some signal theory concepts are applicable to and greatly facilitate the digital-computer diagnosis of electrocardiograms. The problems involved are twofold, namely the representation problem and the classification problem. There exist in the literature, numerous statistical methods applicable to the classification problem; however, without an efficient representation, the great amount of work involved in the statistical calculation is formidable. Thus an efficient representation of ECGs is indispensable and we find that the orthonormal exponential functions are very adequate for this purpose. (Author)

AD-277 030 Div. 8
(TISTE/CRJ) OTS price $6.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
POWER AND ENERGY RELATIONS IN BIDIRECTIONAL WAVEGUIDES.
Doctoral thesis,
by Paul Chorney. 1 Sep 61, 65p. incl. illus. tables, 37 refs. (Technical rept. no. 396)
(Contract DA 36-039-sc-78108, Proj. 3-99-00-000)
Unclassified report

DESCRIPTORS: *Waveguides - Theory, *Wave transmission - Electromagnetic theory. Electromagnetic waves, Microwaves, Propagation, Electromagnetic properties, Materials, Conductors, Ferrites, Plasma physics, Waveguide couplers, Mathematical analysis, Partial differential equations, Integration, Integral transforms, Matrix algebra.

A broad class of uniform waveguides is defined as bidirectional because the waves supported by these waveguides propagate with the same dispersion relation in either direction along the waveguide axis. The requirements for bidirectionality are defined, and several examples of bidirectional waveguides are given; typical examples are waveguides containing isotropic media, and waveguides containing properly oriented magnetized ferrites and plasmas. For lossless, passive bidirectional waveguides, some general theorems are derived which relate the power carried by the waves with a quantity called pseudo energy. The energy-like terms in the complex Poynting theorem do not truly represent energy when a medium is dispersive: hence the name, pseudo energy. The theorems apply to three types of waves: (a) purely propagating, (b) cutoff, and (c) complex. Several examples are given which illustrate the physical implications of the theory. A good deal of attention is paid to waves having complex propagation constants in lossless, passive waveguides. (Author)

AD-277 038 Div. 8
(TISTE/CAM) OTS price $10.10

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
(No title).
Progress rept. no. 21, 1 Oct 61-31 Mar 62,
by Ernst Weber. 31 Mar 62, 115p. incl. illus. tables (Rept. no. R-452.21-62)
(Contract AF 18(600)1505)
Unclassified report

DESCRIPTORS: *Plasma physics, *Electromagnetic waves, *Solid state physics, *Microwave networks, *Communications theory. Parametric amplifiers, Distributed amplifiers, Microwaves, Scattering, Propagation, Gas discharges, Cavity resonators, Waveguides, Transmission lines, Electronic circuits, Electrical networks, Metal films, Thin films, Ferromagnetic materials, Digital systems, Television communication systems, Lasers, Mathematical analysis, Theory, Radiofrequency filters, Slot antennas, Diodes, Synthesis, Ruby, Linear systems, Magnetic fields.

The program at the Microwave Research Institute involves academic research activities of faculty primarily from the departments of electrophysics, electrical engineering, and physics and covers a broad spectrum ranging from basic theoretical programs in physics, mathematics, and engineering to experimental programs involving basic measurements and the development of devices and materials. An over-all summary of some of these activities is provided. Activities are compiled

under six descriptive subject headings: electromagnetics, plasma electrophysics and electronics, solid state and materials research, microwave circuits, network theory, and systems and control. (Author)

AD-277 039 Div. 8, 15, 25
(TISTP/JW) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ON ELECTROMAGNETIC GREEN'S FUNCTIONS FOR UNIAXIALLY ANISOTROPIC REGIONS,
by E. Arbel and L. B. Felsen. 26 Feb 62, 32p. incl. illus. 21 refs. (Research rept. no. PIBMRI-985-61)
(Contract AF 19(604)4143, Proj. 5635)
(AFCRL 62-165) Unclassified report

DESCRIPTORS: *Green's function, *Electromagnetic waves. Permeameters, Plasma physics, Magnetic properties, Radiation effects, Cylindrical bodies, Diffraction.

The formulation of electromagnetic radiation and diffraction problems in uniaxially anisotropic regions is discussed. The properties of the medium, whose permittivity and (or) permeability may be anisotropic, are allowed to vary along the direction of the optic (z) axis; the region can be bounded by a perfectly conducting cylindrical structure whose axis is parallel to z. The electromagnetic fields radiated by arbitrary source distributions in the region are represented as a superposition of vector fields which separate into E and H modes relative to the z-direction; the modal amplitudes satisfy non-uniform transmission line equations. Expressions for the dyadic Green's functions are given in terms of appropriately defined scalar functions, and simplifications for special cases are discussed. These results are applied to the study of the radiation from various elementary source distributions in an infinite and semi-infinite homogeneous region with uniaxially anisotropic permittivity (as in a plasma with an externally superposed strong magnetic field). Emphasis is placed on the asymptotic evaluation and physical interpretation of the formal solutions. (Author)

AD-277 044 Div. 8
(TISTE/CAM) OTS price $5.60

Radio Corp. of America, Harrison, N. J.
DESIGN AND DEVELOPMENT OF A ONE-HALF WATT HEATER POWER REDUCED SIZE NUVISTOR TRIODE.
Interim development rept. no. 6, 1 Oct-31 Dec 61, by W. J. Welwig and R. K. Reusch. 31 Dec 61, 52p. incl. illus. tables.
(Contract NObsr-81478)
Unclassified report

DESCRIPTORS: *Triodes - Design, *Electron tubes. Capacitance bridges, Admittance, Feedback, Noise (Radio), Measurement, Cathodes (Electron tubes), Electron tube heaters, Microwave amplifiers, Oscillator circuits, Electronic circuits, Ceramic materials, Tungsten, Electrodes, Molybdenum, Mechanical properties, Electrical properties, Life expectancy, Tests.

Development of a small size ceramic-metal envelope medium-mu triode of concentric cylindrical cantilever electrode construction is presented. This tube has a maximum heater power of one-half watt and other electrical characteristics approximating those of the RCA nuvistor general purpose tride, type 7586. Tests in the UHF region indicated that this is an excellent tube for amplifier and low power oscillator service. Specifically, tests conducted in a strip line oscillator circuit have shown the tube to be capable of oscillation at least to 2.1 gc with less than 0.3 watt plate power input. (Author)

AD-277 047 Div. 8
(TISTE/CAM) OTS price $2.60

Sperry Gyroscope Co., Great Neck, N. Y.
TRAVELING-WAVE-TUBE MIXER PROGRAM.
Interim engineering rept. no. 4, 1 Feb-30 Apr 62, by L. Magill, C. Burklund, and A. S. Ferello. May 62, 29p. incl. illus. tables, 3 refs.
(Rept. no. NA-8210-8283-4)
(Contract AF 33(616)8074)
Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Mixer tubes, *Microwave amplifiers, *Parametric amplifiers. Helixes, Electronic circuits, Coupling circuits, Electron guns, Electron beams, Focusing, Magnetic fields, Cathodes (Electron tubes), Attenuation, L band, X band, Waveguide couplers, Backward-wave amplifiers, Backward-wave oscillators, Microwave oscillators, Design, Tests.

The design of a full-frequency device was initiated and the procedure used to determine helix parameters is presented. A comparison of forward- and backward-wave interaction for use in the input of the traveling-wave tube mixer was completed. The forward-wave interaction device was selected. A high-precision helix support structure, as used in a previously successful application, is proposed for use with the new full-frequency device. A new focusing structure and operating voltage for the full-frequency V-band mixer are discussed. The work effort directed towards obtaining electrical design information from the experimental X-band mixer was terminated. This information is to be obtained directly from the new full-frequency V-band. (Author)

AD-277 111 Div. 8, 25
(TISTE/CRJ) OTS price $2.60

TYCO Labs., Inc., Waltham, Mass.
HIGH Q VARACTOR DIODES.
Quarterly rept. no. 1, 1 Mar-31 May 62. 28 June 62, 12p. incl. illus. tables, 4 refs.
(Contract NObsr-87340)
Unclassified report

DESCRIPTORS: *Diodes - Semiconductors. X band, Gallium compounds, Arsenides, Growth, Single crystals, Electrostatic capacitance, Voltage, Measurement, Zinc, Cadmium, K band.

Efforts are being made to develop varactor diodes having low pump power when operating at X-band. A tentative specification is operation at 10 mw of pump power from a pump at 24 kmc, yielding a noise figure not greater than 3 db at X-band, single channel operation at 25 C. The program consists basically of two concurrent phases: (1) improvement of current state-of-the-art GaAs varactors to meet the above specification, and (2) investigation to high energy gap semiconductors with a view to obtaining higher Q varactors than are possible using GaAs. The following areas were investigated: (1) evaluation of epitaxial GaAs for varactors, (2) design of a new package and assembly procedure, (3) growth of epitaxial GaAs, and (4) growth of large area alloyed junctions in GaAs. (Author)

AD-277 172 Div. 8, 26
(TISTE/CDM) OTS price $5.60

Linfield Research Inst., McMinnville, Oreg.
FIELD EMISSION SWITCH TUBE STUDY.

Final rept., 17 Dec 59-17 Dec 61,
by F. M. Charbonnier and E. E. Martin.
22 June 62, 50p. incl. illus. table, refs.
(Contract AF 30(602)2157, Proj. 5573)
(RADC TDR 62-163) Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes) - Field emission, *Electron tubes, *Pulse generators, *Electronic switches, *Manufacturing methods - Electron tubes. Design, Tests, Electron beams, Electrical properties, Tetrodes, Feasibility studies, Radar equipment, Processing, Degasification, Filaments, Materials, Packaging, Tungsten, Molybdenum, Vacuum seals.

A study was made of the feasibility of using field emission cathodes in high vacuum switch tubes for radar pulser applications. The work was based on the use of multiple-needle field emission cathodes consisting of sharp tungsten needles evenly spaced along a filament. The electrical characteristics of single and multiple needle field emitters are discussed. The effects of inter-emitter shielding and tip nonuniformity in multiple needle structures are analyzed. A modular concept of switch tube design was adopted, and the development of a successful experimental module was undertaken. Emphasis was directed toward problems which related directly to effective use of field emission cathodes and thus required a novel approach. Tubes based on five successively larger and more sophisticated module designs were constructed and tested. Successive tubes of both types showed steady improvement in peak pulse current, corresponding beam perveance and sharing of the emission between needles. (Author)

AD-277 194 Div. 8
(TISTE/CDM) OTS price $10.10

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
A THEORY FOR BROADBAND TUNNEL DIODE AMPLIFIERS,
by Lowell I. Smilen. 20 Apr 62, 120p. incl. illus. 24 refs. (Research rept. no. PIBMRI-998-62)
(Contract AF 30(602)2213, Proj. 8505)
(RADC TDR 62-191)
Unclassified report

DESCRIPTORS: *Diodes, *Microwave amplifiers - Broadband, *Transducers, *Negative resistance circuits, *Power amplifiers. Mathematical analysis, Electronic circuits, Frequency stabilizers, Sensitivity, Design, Theory, Amplifiers.

Contents:
Optimum single diode power amplifier
Nonreciprocal equalization
Reciprocal equalization
Single diode amplifiers using two-port equalizers
Transmission amplifier
Reflection amplifier
Multiple diode amplifiers
Nonreciprocal and reciprocal equalization
Noise figure
Optimun single and multiple stage amplifiers
Transmission amplifiers
Reflection amplifier
Limitations imposed by the series parasitic inductance
Transducer power gain
Stability and synthesis
A theorem on the potential stability of tunnel diodes

AD-277 199 Div. 8, 26
(TISTW/EET) OTS price $11.00

RCA Service Co., Inc., Camden, N. J.
MAINTAINABILITY PREDICTION TECHNIQUE.
Progress rept. no. 4 on Phase 4.
15 Mar 62, 142p. incl. illus. tables, 16 refs.
(Contract AF 30(602)2057, Proj. 5519)
(RADC TDR 62-156)
Unclassified report

DESCRIPTORS: *Electronic equipment - Maintenance, *Maintenance - Electronic equipment. Reliability, Design, Military requirements, Mathematical prediction, Probability, Statistical analysis, Maintenance personnel, Air force equipment.

A maintainability prediction technique applicable to ground electronic equipment is described. The prediction technique entails the accomplishment of a maintenance analysis using design information for a number of sample tasks selected from the equipment to be evaluated. Maintenance requirements revealed by this analysis are next scored or rated by the use of an established design checklist criteria. Task scores are translated into expected down time requirements by means of a prediction equation. Methods provided will permit detailed examination of specific features within a proposed design and decisions regarding alternate courses of corrective action to be mathematically made. (Author)

AD-277 203 Div. 8, 26
(TISTE/CAM) OTS price $15.50

RCA Defense Electronic Products, Camden, N. J.
PERFORMANCE AND CAPABILITY OF MICRO-MODULES, PART II.
Formal engineering rept. on Micro-Module Production Program.
10 Apr 62, 1v. incl. illus. tables.
(Contract DA 36-039-sc-75968)
Unclassified report

DESCRIPTORS: *Microminiaturization (Electronics), *Manufacturing methods. Research program administration, Electronic equipment, Capacitors, Resistors, Transistors, Diodes, Semiconductors, Crystals, Electronic circuits, Switching circuits, Memory devices, Heat transfer, Pulse transformers, Oscillator circuits, Digital computers, Radiofrequency amplifiers, Radiofrequency oscillators, Pulse generators, Audio amplifiers, Modulators, Discriminators, Reliability, Life expectancy, Test equipment, Test methods.

State-of-the-air techniques were used successfully in the establishment of the micro-module as a practical, reliable building block for electronic equipment. Engineering techniques were evolved for the design, production, and evaluation of various types of microelements, including resistors, capacitors, inductors, transistors, diodes, and quartz crystals. Sixteen different types of micro-modules for communications and data-processing equipment were successfully designed and constructed. The feasibility and reliability of the 16 micro-module types were demonstrated by their satisfactory performance through electrical, environmental, and life tests. Life testing of final-grade micro-modules was continued beyond the required 2000 hours to provide additional reliability data. (Author)

AD-277 216 Div. 8
(TISTE/CDM) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
THE DETERMINATION OF CORRECTIONS TO THE REFLECT-

ING SURFACE OF THE PINCUSHION TYPE ANTENNA BY APPLICATION OF PHOTO MEASUREMENTS,
by Dean C. Merchant. May 62, 17p. incl. illus. tables, 5 refs. (Rept. no. RADC TDR 62-36)
(Proj. 5535)
Unclassified report

DESCRIPTORS: *Parabolic antennas, *Antennas - Measurement. Calibration, Corrections, Determination, Errors, Aerial photography, Mapping, Photographic analysis.

An analysis was made of the Pincushion antenna. It is generally conceded that the actual shape of the Pincushion antenna deviates significant amounts from the desired theoretical parabola of revolution. The development of a photogrammetric method for measuring specific errors of the actual antenna from the desired theoretical pattern is described. It is concluded that the photogrammetric method will feasibly provide the necessary measurement accuracy. (Author)

AD-277 222 Div. 8, 7, 26
(TISTE/CAM) OTS price $9.10

Western Electric Co., Winston-Salem, N. C.
INDUSTRIAL PREPAREDNESS STUDY LACQUER FILM CAPACITORS.
Quarterly progress rept. no. 13, 25 Feb-25 May 62,
by E. J. Dennard. 25 May 62, 100p. incl. illus. tables.
(Contract DA 36-039-sc-81268)
Unclassified report

DESCRIPTORS: *Paper capacitors - Processing, *Manufacturing methods. Polymers, Carbohydrates, Varnishes, Resins, Cellulose, Metal films, Thin films, Metal coatings, Preparation, Production, Quality control, Electrical properties, Physical properties, Chemical properties, Resonance absorption, Magnetic fields, Life expectancy, Tests.

Effort was directed toward completion of testing of the 5.6 mfd capacitors for preproduction sample approval and manufacture of the 0.1 mfd and 1.0 mfd pilot run capacitors. The 5.6 mfd preproduction tests were completed. Work continued on the development of polycarbonate lacquer film and capacitors. Life tests are under way on sample capacitors made from various resins. Data are beginning to indicate which of the resins offer promise. (Author)

AD-277 226 Div. 8, 26
(TISTE/CAM) OTS price $8.10

Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURE. MECHANIZATION OF SEMICONDUCTOR DEVICES 2N560, 2N1051, 2N1072, 2N1195, 1N664, 1N665, 1N666, 1N667, 1N668, 1N669, 1N673, 1N675, 1N697, 1N701 AND 1N810.
Quarterly progress rept. no. 11, 28 Dec 61-26 Mar 62,
by M. N. Reppert. 87p. incl. illus.
(Contract DA 36-039-sc-81294)
Unclassified report

DESCRIPTORS: *Semiconductors, *Transistors, *Diodes, *Manufacturing methods - Automation. Machines, Industrial equipment, Production, Design, Construction, Processing, Cleaning, Coatings, Coding, Packaging, Test sets.

AD-277 265 Div. 8, 30
(TISTE/CDM) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
COMPUTER SIMULATION ROUTINE FOR RADIO FREQUENCY BACKSCATTER: SOME COMPUTER SUBROUTINES FOR THE ANALYSIS OF DIGITALIZED STATIONARY AND ERGODIC DATA,
by G. W. Evans, II., R. C. McCarty and others.
May 62, 22p. incl. illus. 2 refs. (Technical rept. no. 3)
(Contract SD-103)
Unclassified report

DESCRIPTORS: *Microwaves - Scattering, *Radar signals, *Data processing systems - Digital systems, *Radar reflections - Simulation, *Programming. Harmonic analysis, Series, Fourier analysis, Integrals, Statistical functions, Numerical methods and procedures, Guided missiles, Radiofrequency, Computers.

Mathematical investigations are being pursued to determine appropriate methods for analyzing digitalized radar backscattered data from missiles. One investigation involves the generation of theorems about, and methods for, analyzing nonstationary processes; the other involves the design of a computer simulation routine which simulates digitalized radar backscattered data. The second investigation provides data containing known information for testing the methods set forth in the first investigation. The data analysis techniques described are numerical approximations either for the mean value and moments of a continuous random variable or for extensions of harmonic analysis to random processes. Most of the concepts are compiled to provide a single source of information with consistent notation. The statistical variables to be used are defined and derived, an outline of harmonic analysis is presented, numerical approximations are derived, and computer flow diagrams are given for the subroutines. (Author)

AD-277 361 Div. 8
(TISTW/RD) OTS price $5.60

Chu Associates, Framingham, Mass.
UHF FERROMAGNETIC PHASE SHIFTERS (200 - 400 mc).
Final rept., 30 Oct 60-30 June 61,
by William D. Fitzgerald and Leslie Klein.
30 June 61, 49p. incl. illus.
(Contracts NObsr-81386 and NObsr-72586)
Unclassified report

DESCRIPTORS: *Phase shifters. Ferromagnetic materials, Ferromagnetism, Ultra high frequency, Standing wave ratios, Resonance, Ferrites, Feasibility studies, Radar antennas, Radar scanning.

UHF ferrite phase shifters are discussed which are unusually compact and require low drive fields. These devices use a dual-mode network with non-linear phase properties. The non-linear phase-multiplier property of this network enables the design and construction of very compact devices. Their operation is based on domain-wall resonance. The material chosen has an internal magnetic field large enough for operation above ferromagnetic resonance, so operation is in the low loss region even for zero, or small, applied control fields. The closed path toroidal geometry implies an efficient magnetic circuit and also contributes to the low field requirements. Two ferrite phase shifters were constructed using the dual-mode network. The first, designed for narrow band operation in the 200 to 350 mc range, is composed of eight dual-mode sections arranged to form a concentric square cross-section. The side dimension of this square is 2-1/8 inches; the length of the phase shifter is 3-1/8 inches. The second device, designed to cover the broader band from 225 to 400 mc, is composed of six dual-mode sections set in a con-

centric triangular cross-section. This triangle is approximately 2-1/2 inches on a side and the strip-line in this case is approximately 2-1/3 inches long. The first device requires 100 oersteds drive field for 360 degrees differential phase shift while the second device requires 130 oersteds for the same phase shift. (Author)

AD-277 362 Div. 8, 2
(TISTP/GRW) OTS price $2.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
INVESTIGATION OF RADIO AURORA, PROJECT AURORA II.
Final rept., Jan 60-Dec 61,
by Walter A. Flood. May 62, 21p. incl. illus. 16 refs. (Rept. no. CM-1407-P-1)
(Contract AF 19(604)6197, Proj. 7661)
(AFCRL 62-443) Unclassified report

DESCRIPTORS: *Aurorae, *Radio astronomy. Radio waves, Very high frequency, Propagation, Wave transmission, Electrons, Density, Scattering.

Existing experimental evidence is shown to be consistent with the idea that auroral backscatter arises from turbulent fluctuations of electron density as described by a Kolmogoroff spectrum. An inner scale of turbulence of one meter is shown to be consistent with the experimental data. It is further shown that the scatter cross section for frequencies greater than 1000 Mc cannot be accurately predicted. A brief summary of an analysis of auroral backscatter amplitude distribution is presented. Occasionally Rice type amplitude distributions are obtained at 49.7 Mc. These distributions admit of only one explanation - that on occasion, over relatively large regions and for intervals of only a few minutes, the electron density in the auroral ionosphere is in excess of 2 x 10 to the 7th power electrons per cubic centimeter. (Author)

AD-277 370 Div. 8,
(TISTE/CRJ) OTS price $2.60

Electronics Research Lab., U. of Calif., Berkeley.
TRANSISTOR BANDPASS AMPLIFIERS OF WELL-DEFINED PERFORMANCE,
by A. R. Boothroyd. 19 Dec 61, 26p. incl. illus. 6 refs. (Series no. 60, Issue no. 424)
(Contract AF 49(638)1043)
(AFOSR-2448) Unclassified report

DESCRIPTORS: *Band-pass amplifiers, *Radio-frequency amplifiers, *Power amplifiers, *Electrical networks. Transistors, Broadband, Transducers, Coupling circuits, Radiofrequency transformers, Impedance matching, Mathematical analysis, Design.

A discussion of basic stability and gain considerations in active two-port networks is followed by an analysis of the conditions under which the transducer gain may be well-defined, in the sense of being affected little by changes in active device parameters. Two methods of achieving well-defined performance, involving mismatching or loading with loss elements respectively at the ports, are treated, and shown to lead to simple design procedures for both single and transformer-coupled cascaded stages. It is also shown that by suitably loading the ports with dominant imaginary terminations the gain characteristic may be made well-defined and analytic in form over wide frequency range. Practical examples of transistor bandpass amplifiers illustrate the theory and show that common-base stages are particularly appropriate for amplifiers of the type considered. In the examples quoted the bandwidth is of the same order as the band-center frequency. (Author)

AD-277 371 Div. 8,
(TISTE/CRJ) OTS price $3.60

Electronics Research Lab., U. of Calif., Berkeley.
THE LARGE AREA PN JUNCTION AS A THREE TERMINAL CIRCUIT ELEMENT,
by G. Hachtel and L. O. Hill. 13 June 61, 27p. incl. illus. 4 refs. (Series no. 60, Issue no. 370)
(Contract AF 33(616)7553, Proj. 4159)
(ASD TN 61-112) Unclassified report

DESCRIPTORS: *Electronic circuits, *Coupling circuits, *Transmission lines, *Phase shifters. Semiconductors, Admittance, Resistance, Electrostatic capacitance, Mathematical analysis, Differential equations, Series, Theory.

A study is made of the large area pn junction as a passive, distributed, 3 terminal device. The analysis assumes a direct analogy between electronic action in the large area pn junction and that in a distributed RC transmission line. Most previous work assumes that a uniform RC line is an adequate representation of the device. However, in typical integrated circuits, the dc voltage level at one end of the large area pn junction invariably differs from that at the other end. The total dc reverse bias across the junction is not constant along the junction interface. This causes the depletion layer capacitance to be nonuniform along the interface. The analysis which follows takes this variation into account. It is shown that for a broad range of bias conditions, the uniform line representation does not introduce sufficient error to justify the more complicated description. The analysis, valid for small excursions from the dc bias levels, used solutions of the transmission line equations to arrive at expressions for the terminal properties of the large area pn junction. A two dimensional analysis is used. (Author)

AD-277 374 Div. 8
(TISTE/CRJ) OTS price $3.60

Electronics Research Lab., U. of Calif., Berkeley.
AN ANALYSIS OF AN INTEGRATED PHASE SHIFT OSCILLATOR,
by G. Hachtel. 14 June 61, 28p. incl. illus. tables, 4 refs. (Series no. 60, Issue no. 375)
(Contract AF 33(616)7553, Proj. 4159)
(ASD TDR 62-5) Unclassified report

DESCRIPTORS: *Phase shifters - Oscillator circuits, *Oscillators, *Miniature electronic equipment. Semiconductors, Electronic circuits, Mathematical analysis, Analysis, Circuits.

An integrated phase shift oscillator (IPSOR) is introduced together with its analysis and design. A restriction is made for an output which is a near harmonic oscillation. The analysis and design proceed on the basis of the equivalence of electronic action in the regions of the IPSOR to those in a lumped circuit model. From the analysis, the first order dependence of the output oscillation on the parameters of the IPSOR regions is established. Experimental observations with carefully chosen lumped circuits verify the analysis and design procedures. (Author)

AD-277 396 Div. 8, 6
(TISTW/RD) OTS price $3.60

Merrimac Research and Development, Inc., Irvington, N. J.
HIGH POWER CIRCULATOR DEVELOPMENT.

Interim development rept. no. 4, 20 Jan-8 May 62. 25 June 62, 28p. incl. illus. 5 refs.
(Contract NObsr-85329)

Unclassified report

DESCRIPTORS: *Waveguides, *Transmission lines, *Radar duplexers. Ferrites, S band, Waveguide couplers, Ferromagnetic materials.

Design was concluded and tests were made at low power on a 3000 mc 10% bandwidth waveguide circulator. Experimental results corresponded essentially to analysis and tests were instituted at 400 kw and 1.2 mw peak powers corresponding to average values of 312 watts and 4750 watts respectively. High power effects were manifested through apparent change of ferrite magnetization and temperature rise in the ferrite slab. A combination of modification of the ferrite cross-section to effect better heat transfer and a reduction of magnetic field to offset change of demagnetization restored the circulator to effective operation. Typical operation taken at 2900 mc and at the higher power shows a transmitter to antenna loss of .5 db and an antenna to receiver loss of 1 db. A ferrite temperature of less than 246 C was recorded at equilibrium with no attempt made to transfer heat from the waveguide. (Author)

AD-277 404 Div. 8
(TISTW/DLW) OTS price $3.00

National Bureau of Standards, Washington, D. C.
TRANSMISSION LOSS IN RADIO PROPAGATION: II,
by Kenneth A. Norton. June 59, 151p. incl. illus. tables, 87 refs. (Technical note no. 12)

Unclassified report

DESCRIPTORS: *Radio waves - Propagation, *Radio transmission - Attenuation, *Wave transmission, *Ionospheric propagation. Surface area, Polarization, Radio interference, Radio reception, Measurement.

Investigations are concerned primarily with the transmission loss encountered in the propagation of radio energy between a transmitting and a receiving antenna. Simple methods are given for determining the magnitude of this transmission loss and its variation in space and time (fading). In addition, methods are given for estimating radio noise and interference levels. When combined, these two methods make possible the estimation of the transmitter power and antenna gain required for satisfactory communication, navigation, or other specific uses of the transmissions. A survey is made of the transmission losses expected for a wide range of conditions, i.e., for distances from 10 to 10,000 statute miles; for radio frequencies from 10 kc to 100,000 mc; for vertical or horizontal polarization; for ground waves, ionospheric waves, and tropospheric waves; over sea water or over land which may be either rough or smooth; and for various geographical and climatological regions. (Author)

AD-277 409 Div. 8, 15, 25
(TISTP/JW) OTS price $4.80

Institute of Mathematical Sciences, New York U., N. Y.
NUMERICAL DATA CONCERNING THE EFFECTIVENESS OF ANTENNAS,
by P. Rabinowitz and W. Magnus. Apr 62, 33p. incl. illus. (Research rept. no. EM-172)
(Contract AF 19(604)5238)
(AFCRL 62-154)

Unclassified report

DESCRIPTORS: *Integral equations, *Antennas. Digital computers, Polynomials, Series, Tables.

Numerical data are given for the eigenvalues of certain integral equations arising in antenna theory. The integral equations are solved using approximations of various degree. The results are shown in tables and in diagrams. A theoretical remark which can be used as a check-up is proved. (Author)

AD-277 410 Div. 8
(TISTP/FR) OTS price $.75

Naval Research Lab., Washington, D. C.
OPERATIONAL PERFORMANCE OF THE NRL THERMISTOR-BRIDGE GAS LEAK DETECTOR AND ITS SENSITIVITY TO VARIOUS GASES,
by P. T. Stine and R. E. Koncen. 11 June 62, 22p. incl. illus. tables, 7 refs.
(NRL rept. no. 5807)

Unclassified report

DESCRIPTORS: *Gas detectors, *Gas leaks. Electric bridges, Thermistors, Sensitivity, Refrigerants, Gases.

The NRL thermistor-bridge gas leak detector is a portable electronic device useful for location of leaks from pressurized systems containing any gas having a thermal conductivity different from that of the ambient air. Operational experience with the device as used aboard nuclear submarines during the past year is most encouraging and indicates that the present design is extremely useful and reliable. Although the gas leak detector was designed as a qualitative device not intended for quantitative measurements, knowledge of its approximate sensitivity to various gases is useful in providing some idea of size and seriousness of a leak. A method is presented for predicting relative sensitivity based upon diffusivity and thermal conductivity. Sensitivity of the device to selected gases was measured in the laboratory and correlated with predicted sensitivities. With the exception of oxygen and nitrogen, which have thermal conductivities very near that of air, results correlated within a factor of two, indicating that the method is adequate for rough prediction, keeping in mind that sensitivity is also a function of operator technique. (Author)

AD-277 427 Div. 8, 14, 26, 17
(TISTW/EET) OTS price $3.60

Sperry Gyroscope Co., Great Neck, N. Y.
CERAMIC-METAL SEALS FOR HIGH-POWER TUBES.
Technical note no. 3, 30 Nov 61-5 Mar 62,
by K. Styhr, Jr., I. Waraksa, and J. A. Murphy.
Mar 62, 23p. incl. illus. tables, 2 refs.
(Rept. no. NA-8250-8268-3)
(Contract AF 30(602)2371, Proj. 5573)
(RADC TDR 62-209)

Unclassified report

DESCRIPTORS: *Metal seals, *Electron tubes. Ceramic materials, Metals, Stresses, Tensile properties, Manufacturing methods, Processing, Sintering, Brazing, Plating, Chemical milling, Coatings, Rupture, Ionization gages, Test equipment, Vacuum systems, Test methods, Reliability.

Studies of the variables encountered during the processing of ceramic-to-metal seals are being conducted, using an analysis of variance of the fractional type, in which second, third, and higher order interactions are evaluated. Four working models of a non-pumping cold-cathode ion gage for use as a life-test vehicle were con-

structed and tested. These gages were shown to be operable, but require minor modifications for optimum performance. Thermal decomposition of impregnated dye penetrants was an effective leak path determination technique when used in conjunction with optical detection methods. (Author)

AD-277 431 Div. 8
(TISTW/RD) OTS price $2.60

United States Sonics Corp., Cambridge, Mass.
PIEZOELECTRIC CONVERTER INVESTIGATION.
Quarterly rept. no. 1, 1 Mar-31 May 62,
by Anthony P. Antonuzzi and Theodore W. Johnson.
31 May 62, 20p. incl. illus. table, 15 refs.
(Contract AF 33(657)8282)
Unclassified report

DESCRIPTORS: *Electroacoustic transducers, *Piezoelectric transducers. Circuits, Ceramic materials, Electrical networks, Feasibility studies, Transducers, Electronic circuits.

Research is presented on the development of a piezoelectric electroacoustic energy converter, which will convert with maximum efficiency the energy in an acoustic field on the order of 173 db. The electrical output must be nominally 100 vdc. It serves as a basic introduction to the principles involved and presents an analysis of the conventional thickness mode transducer. It is presented using the rationalized MKS system of units which is especially desirable when working with equivalent circuits. A schematic representation is derived and analyzed. (Author)

AD-277 460 Div. 8, 30
(TISTP/JW) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A HIGH SPEED DATA READOUT SYSTEM FOR RADIOSONDES,
by Emmett J. Pybus. Mar 62, 20p. incl. illus.
(BRL technical note no. 1459)
(Proj. 599-25-001)
Unclassified report

DESCRIPTORS: *Radiosondes, *Data processing systems. Telemetering data, Digital computers, Sampling, Rocket signals, Sounding rockets.

A commercially available digital counter and printer combination may be used, with no additional modifications, with the GMD-1 radiosonde system to obtain rapid readout of data. The system is useful where rapid sampling of data is required, as in rocket soundings. (Author)

AD-277 479 Div. 8, 2
(TISTP/FR) OTS price $7.60

Electromagnetic Research Corp., College Park, Md.
STUDIES IN IONOSPHERIC PROPAGATION. THE EXACT EARTH-FLATTENING PROCEDURE IN IONOSPHERIC PROPAGATION PROBLEMS. PART I. VLF SIGNAL ENHANCEMENTS AND HF FADEOUTS DURING SUDDEN IONOSPHERIC DISTURBANCES. PART II.
Final rept.,
by M. Katzin and B. Y.-C. Koo. 15 Apr 62, 71p. incl. illus. tables, 72 refs. (Rept no. CRC-7233-1)
(Contract AF 19(604)7233, Proj. 5631)
(AFCRL 62-341)
Unclassified report

DESCRIPTORS: *Ionosphere, *Ionospheric propagation, *Ionospheric disturbances. Radio waves, High frequency, Very low frequency, Attenuation, Earth, Bessel functions.

The exact earth-flattening procedure developed for an isotropic spherically-stratified atmosphere, is extended to the case of a spherical earth and atmosphere enveloped by a sharply bounded ionosphere. The general solution of the problem is formulated as an integral representation, from which may be derived either a ray-optical series or a normal mode series. In the latter case, the normal modes involve the normalized spherical Hankel function and its derivative. An improved method of obtaining the zeros of these functions is derived which is not of asymptotic character. Simultaneous observations of short-wave fade-outs of a 13.5-Mc signal and sudden signal enhancements of a 31.15-kc signal over substantially the same transatlantic path of about 5400 km show no evident correlation between the magnitudes of the two effects of the SID. This absence of correlation is understandable on the basis of a two-layer D-region. (Author)

AD-277 485 Div. 8
(TISTE/CRJ) OTS price $2.60

Traveling Wave Tube Product Section, General Electric Co., Palo Alto, Calif.
35-KMC BEAM INTERACTION STUDY.
Interim engineering rept. no. 1, 30 Mar-20 June 62,
by R. M. White and C. E. Enderby. 20 June 62, 17p. incl. illus. (Rept. no. TIS R62ELM 233-1)
(Contract AF 33(657)8360, Proj. 4156)
Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Electronic circuits. Extremely high frequency, K band, Test equipment, Microwave probes, Propagation, Impedance, Electric fields, Frequency shift, Measurement.

Research concerns the establishment of the properties of ring-plane slow-wave circuits for use with high-perveance beams in traveling-wave tubes capable eventually of operating above 35 kmc with a 10% minimum bandwidth, and promise of eventually possessing efficiencies greater than 10%. The ring-plane circuit consists of a set of metallic rings spaced at periodic intervals on a common axis and supported at their outer surfaces by one or more conducting planes. The entire structure of rings and plane(s) is contained within a cylindrical pipe which serves as the vacuum envelope for the traveling-wave tube. An electron beam, preferably of high perveance, passes through the rings in succession in the direction of their common axis. Cold-test measurements on a family of ring-plane structures are described. These structures appear to be suitable for use in high-power traveling-wave tubes for operation above 35 kmc. Measurement techniques and typical data are given. (Author)

9. FLUID MECHANICS

AD-277 025 Div. 9, 15, 25
(TISTP/JW) OTS price $6.60

Minnesota U., Minneapolis.
MASS AND HEAT TRANSFER RATES FOR LARGE GRADIENTS OF CONCENTRATION AND TEMPERATURE,
by William E. Ranz. 15 Mar 62, 58p. incl. illus.

tables, refs. (Technical rept. no. 1)
(Contract DA 11-022-ORD-3084, Proj. 5B99-01-004)
(OOR Proj. 2340)
Unclassified report

DESCRIPTORS: *Heat transfer, *Transport properties. Binomials, Density, Errors, Velocity, Gases.

AD-277 029 Div. 9
(TISTA/WAW) OTS price $9.60

Martin-Marietta Corp., Baltimore, Md.
ELASTO-PLASTIC ANALYSIS OF STRUCTURES UNDER LOAD AND TWO-DIMENSIONAL TEMPERATURE DISTRIBUTIONS. VOLUME I. ANALYSIS DEVELOPMENT AND EXPERIMENTAL PROGRAM.
Final rept., 15 Dec 60-15 Nov 61 on Structural Design Criteria,
by P. C. Huang and R. J. Edwards. Apr 62, 108p. incl. illus. tables (Rept. no. RR-26-I)
(Contract AF 33(616)7738, Proj. 1367)
(ASD TR 61-667, vol. 1)
Unclassified report

DESCRIPTORS: *Aerodynamics - Elasticity, *Elasticity, *Plasticity. Airframes, Aerodynamic heating, Thermal stresses, Deformation, High temperature research, Instrumentation, Strain gages, Thermocouples, Mathematical analysis, Digital computers, Programming, Differential equations, Integral equations, Measurement, Test facilites, Load distribution, Stresses.

Investigations are described which were performed to determine experimentally the validity of the time-independent aspects of a time-dependent elasto-plastic stress and strain analysis method for structures exposed to complex load and two-dimensional elevated temperature environments. Experiments, consisting of tests of long flat plates subjected to uniaxial loads and temperatures which varied in two directions, are described. These were specifically designed to evaluate the accuracy of the analysis method. Magnitude and duration of the test variables were such that the strains induced by loading were in the plastic range and appreciable thermal stress systems were introduced. Significant creep strains were eliminated by short-time continuous loading. Experimental strains were compared with analytical strains calculated for conditions identical with the tests. Within the range of test parameters selected, the degree of correlation achieved indicates verification of the time-independent portion of the analysis method. (Author)

AD-277 072 Div. 9
(TISTP/WH) OTS price $6.60

Jet Propulsion Center, Purdue U., Lafayette, Ind.
EFFECTS OF SELECTED GAS STREAM PARAMETERS AND COOLANT PHYSICAL PROPERTIES ON LIQUID FILM COOLING,
by D. L. Emmons and C. F. Warner. Jan 62, 54p. incl. illus. tables, 12 refs. (Rept. no. I-62-2)
(Contract Nonr-110021)
Unclassified report

DESCRIPTORS: *Gas flow, *Heat transfer, *Heat exchangers. Liquid cooled, Thin films, Gases, Reynolds number, Pressure, Temperature, Physical properties, Thermal conductivity, Coolants.

Experimental determinations were made of effects of changes in the temperature, pressure, and Reynolds number of a hot gas stream upon the required flow rates of a single liquid (water) used for film cooling different lengths (4, 5, 6, 7, and 8 in.) of a cylindrical test section (3.14 in. inside diameter). Experiments were also conducted with water, anhydrous ammonia, ethyl alcohol, and Freon-113 for determining the effects of the physical properties of those liquids on the required film coolant flow rates for a single condition of gas stream temperature, pressure; and Reynolds number. Determinations were made of the influence of the afore-mentioned gas stream parameters upon the heat transfer coefficients from the hot gas stream to the surface of the liquid film coolant. The results showed that the heat transfer coefficient depended primarily upon the Reynolds number of the hot gas stream, and varied with the liquid employed as the film coolant. (Author)

AD-277 153 Div. 9, 25
(TISTA/WAW) OTS price $3.60

Boeing Scientific Research Labs., Seattle, Wash.
SOME EXACT SOLUTIONS FOR TWO-DIMENSIONAL HYDROMAGNETIC STEADY FLOWS,
by L. C. Levitt. June 62, 30p. incl. illus. 3 refs. (Rept. no. D1-82-0170)
Unclassified report

Also available from the author.

DESCRIPTORS: *Magnetohydrodynamics - Mathematical analysis. Differential equations, Integral equations.

A study is presented of two symmetry-types of planar hydromagnetic steady flows of a uniform, incompressible conducting fluid, moving under the influence of its own magnetic field. The motions considered are special cases of a fairly wide class of hydromagnetic flows exhibited by Lin (Archive of Rational Mechanics and Analysis 1:391-395, 1958). The equations of motion and induction, for both types, are formulated as nonlinear partial differential equations in a pair of stream functions, for the fluid velocity and magnetic field. Various general features of these flows are discussed, and a number of special exact solutions are derived for one of these types, in unbounded space. In an appendix, a method is given by which the formulation of the infinite-conductivity cases is reducible to a single equation. (Author)

AD-277 170 Div. 9, 30
(TISTA/SEB) OTS price $4.60

Institute of Aerophysics, U. of Toronto (Canada).
MEASUREMENT OF THE DENSITY DISTRIBUTION IN A RAREFIED GAS FLOW USING THE FLUORESCENCE INDUCED BY A THIN ELECTRON BEAM,
by E. O. Gadamer. Mar 62, 40p. incl. illus. tables, 12 refs. (UTIA rept. no. 83)
(Contract AF 49(638)281)
(AFOSR TN 60-500) Unclassified report

DESCRIPTORS: *Superaerodynamics, *Gas flow - Density. Test methods, Test equipment, Electron beams, Fluorescence, Theory, Photomultipliers, Electron guns, Measurement, Tests, Distribution, Gases.

The concept of utilizing a confined gaseous fluorescence, induced by a thin but energetic electron beam, for the measurement of local rarefied gas densities, notably in a low-density flow field, was applied in the development of an optical electron beam density probe. The instrument consists of a high-voltage electron gun sealed

to the test section of a low-density aerodynamics facility. One or more small-diameter exit tubes allow the generated electron beam to enter the flow field. The beam-induced fluorescence which is coincident with the beam and whose intensity depends on the local gas density, is detected by a photomultiplier arrangement. The measured photocurrent is calibrated directly against the gas density. Point measurements are made feasible by controlling the location of the gun with the help of a traversing mechanism, and by selecting the radiation coming from a small section of the electron beam. The following topics are discussed: relevant properties of the fluorescence mechanism, scaling of an electron gun to a low-density aerodynamics facility, design considerations for an electron gun, the calibration, and limitations of the method. Results are presented from an experimental investigation of the radial density distribution of the molecular flux that emerges from a short cylindrical tube. Comparison with a theoretical solution is made. (Author)

AD-277 177 Div. 9, 25
(TISTP/JW) OTS price $4.60

Mechanical Technology Inc., Latham, N. Y.
TWO PHASE FLOW IN THRUST BEARINGS. PART I. DERIVATION OF EQUATIONS,
Technical rept.,
by I. Beretsky. 11 June 62, 34p. incl. illus.
(Rept. no. MTI-62TR9)
(Contract Nonr-373100)
Unclassified report

DESCRIPTORS: *Thrust bearings, *Condensation reactions, *Equations of state. Vapors, Lubricants, Temperature, Cooling, Viscosity, Boundary layer, Heat transfer.

AD-277 178 Div. 9, 25
(TISTA/WAW) OTS price $12.00

Martin Marietta Corp., Baltimore, Md.
ELASTO-PLASTIC ANALYSIS OF STRUCTURES UNDER LOAD AND TWO-DIMENSIONAL TEMPERATURE DISTRIBUTIONS. VOLUME II. SUMMARY OF TEST DATA.
Final rept., 15 Dec 60-15 Nov 61 on Structural Design Criteria,
by P. C. Huang and R. J. Edwards. Apr 62, 164p. incl. illus. tables (Rept. no. RR-26-2)
(Contract AF 33(616)7738, Proj. 1367)
(ASD TR 61-667, vol. 2)
Unclassified report

DESCRIPTORS: *Aerodynamics - Elasticity, *Elasticity - Tests, *Plasticity - Tests, *Metal plates. Airframes, Aerodynamic heating, Thermal stresses, Deformation, High temperature research, Instrumentation, Strain gages, Thermocouples, Mathematical analysis, Digital computers, Programming, Differential equations, Integral equations, Measurement, Test facilities, Load distribution, Stresses.

This report describes investigations performed to determine experimentally the validity of the time-independent aspects of a time-dependent elasto-plastic stress and strain analysis method for structures exposed to complex load and two-dimensional elevated temperature environments. Experiments, consisting of tests of long flat plates subjected to uniaxial loads and temperatures which varied in two directions, are described. These were specifically designed to evaluate the accuracy of the analysis method. Magnitude and duration of the test variables were such that the strains induced by loading were in the plastic range and appreciable thermal stress systems were introduced. Significant creep strains were eliminated by short-time continuous loading. Experimental strains were compared with analytical strains calculated for conditions identical with the tests. Within the range of test parameters selected, the degree of correlation achieved indicates verification of the time-independent portion of the analysis method. (Author)

AD-277 205 Div. 9, 31
(TISTA/GEC) OTS price $4.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
PRESSURE FIELD AROUND A MARINE PROPELLER OPERATING IN A WAKE,
by S. Tsakonas, J. P. Breslin, and N. Jen.
May 62, 1v. incl. illus. tables, 9 refs. (Rept. no. 857)
(Contract Nonr-26316)
Unclassified report

DESCRIPTORS: *Marine propellers, *Wake, *Hydrodynamics - Pressure. Fluid flow, Vibration, Thrust, Torque, Harmonic analysis, Mathematical analysis, Theory.

An investigation was made on the effect of non-uniform inflow conditions on the vibratory pressure generated by a marine propeller. In analyzing the pressure signals which are associated with propeller thrust and torque, general expressions are developed in terms of the harmonic constituents of the non-uniform inflow field. The analysis indicates that all possible combinations of propeller-loading blade harmonics with those of the field-point function contribute to the pressure signal. The effect of the non-uniformity of the inflow conditions persists in the field and is felt at greater distances from the propeller plane than is the case for uniform flow. At a distance of one propeller radius the pressure associated with the non-uniform conditions is almost 60% of the total. Two mathematical models were studied. In both, the thrust-producing forces are assumed to be generated from a circular sector projection in the propeller plane, whereas the torque-producing forces are assumed to be generated in the first from a rectangular projection, and in the second from a triangular projection, in the plane through the propeller axis and the line of mid-chord points. The study of both models indicates that the pressure associated with torque is local in effect, being limited to the neighborhood of the propeller. (Author)

AD-277 220 Div. 9, 10, 27
(TISTA/VGW) OTS price $7.60

United Technology Corp., Sunnyvale, Calif.
DYNAMICS OF TWO-PHASE FLOW IN ROCKET NOZZLES.
Quarterly technical progress rept. no. 4,
1 Feb-30 Apr 62,
by B. G. Wrenn, R. Dunlap and others. 26 May 62, 59p. incl. illus. 18 refs. (Rept. no. 2005 QT4)
(Contract NOw 61-0760-c)
Unclassified report

DESCRIPTORS: *Solid rocket propellants - Exhaust gases, *Combustion chamber gases - Fuel additives, *Exhaust gases - Fluid flow. Metals, Rocket motor nozzles, Aerodynamics, Gas flow, Particles, Model tests, Design, Spheres, Drag, Velocity, Mathematical analysis, Combustion, Equations.

Progress in a theoretical and experimental investigation of the radial and axial velocity lag of a solid disperse phase in accelerating

gases is reported. The objective is to obtain basic data regarding the nozzle flow dynamics of the gas-particle mixture which results from the combustion of solid propellants containing metal additives. The effect of weight fraction of the solid phase, particle size, and gas properties on mass flow in conventionally shaped nozzles was measured experimentally using a differential nozzle apparatus. Results substantially confirm the one-dimensional theory of two-phase flow in the subsonic portion of conventionally shaped nozzles. Excellent agreement was found between constant-lag and precise machine solutions to the problem of one-dimensional, two-phase flow in a nozzle. Analytical formulae were developed for the calculation of the characteristic exhaust velocity for rocket motors with conventional nozzles and curves for predicting performance are presented. An investigation of the physical constants important to the prediction of two-phase flow effects showed that fundamental information on particle drag coefficient is not available in some flow regimes. (Author)

AD-277 290 Div. 9, 12
(TISTA/WAW) OTS price $3.60

Boeing Scientific Research Labs., Seattle, Wash.
OPTIMUM SLENDER BODIES OF REVOLUTION IN NEWTONIAN FLOW,
by Angelo Miele. Apr 62, 27p. illus. tables, 14 refs. (Flight Sciences Lab. Technical rept. no. 56; Document no. D1-82-0160)
Unclassified report

Also available from the author.

DESCRIPTORS: *Bodies of revolution - Hypersonics. Aerodynamics, Mathematical analysis, Differential equations, Integral equations, Drag.

The problem of minimizing the drag of a slender body of revolution in Newtonian flow at zero angle of attack is considered. A generalized closed form expression is obtained for the optimum shape which is valid regardless of the conditions imposed on the diameter, length, wetted area, and volume. This expression contains as particular cases those valid when any two of these four quantities are fixed while the remaining are free. A 3/4-power law, which previous authors had recognized to be a good approximation to the exact variational solution in Newtonian flow, is found to be a rigorous solution of the Euler-Lagrange equations if the slender body approximation is used. For the cases considered, analytical expressions are derived for the thickness ratio and the drag coefficient. Also, to verify the minimal properties of the solutions obtained, the optimum shapes are compared. This comparison can be reduced to the bare essentials if an appropriate quality coefficient is introduced for the drag. Only in the case where the diameter and the length are given is the quality coefficient proportional to the drag coefficient. Otherwise, it generally involves the product of powers of three dimensionless integrals associated with the drag, the wetted area, and the volume. (Author)

AD-277 354 Div. 9
(TISTA/WAW) OTS price $5.60

Firestone Flight Sciences Lab., Calif. Inst. of Tech., Pasadena.
THE EFFECT OF HEAT TRANSFER ON SEPARATION OF LAMINAR COMPRESSIBLE BOUNDARY LAYERS.
Technical rept. no. 2 on Separated Flows Project, by Stuart B. Savage. 1 June 62, 43p. incl. illus. tables, 32 refs.
(Contract AF 49(638)916)
Unclassified report

DESCRIPTORS: *Laminar boundary layer - Mathematical analysis. Compressible flow, Aerodynamics, Heat transfer, Turbulence, Turbulent boundary layer, Separation, Differential equations, Integral equations, Partial differential equations.

Tani's integral method (Jnl. Aero. Sci., Vol. 21, No. 7:487-504, 1954) is extended to treat laminar two-dimensional compressible boundary layers with heat transfer and arbitrary pressure gradient for both attached and separated flows. A carefully chosen one-parameter family for the velocity profiles and a universal stagnation enthalpy profile are assumed for attached flows. The accuracy of the method is examined by comparing the results with several exact numerical solutions and satisfactory agreement is obtained. For separated flows one-parameter families are assumed for both the velocity and stagnation enthalpy profiles. In this case the accuracy of the method is poor; however, suggestions are made as to how it might be improved within the present framework. (Author)

AD-277 360 Div. 9
(TISTA/GEC) OTS price $6.60

Northwestern U., Evanston, Ill.
THE EFFECT OF RADIATION ON SHOCK VELOCITY ATTENUATION IN ELECTROMAGNETIC SHOCK TUBES,
by J. A. Thornton and Ali Bulent Cambel.
Apr 61, 55p. incl. illus. 18 refs.
(Contract AF 49(638)879)
(AFOSR-1101) Unclassified report

DESCRIPTORS: *Shock waves - Electromagnetic fields, *Shock waves - Deceleration, Blast, Shock tubes, Velocity, Theory, Ionization, Dissociation, Test methods.

Observations are reported in a study of effects of radiation on shock velocity attenuation in the conical electromagnetic shock tube. A summary is included of findings which have appeared in the literature along with the approximate blast wave theory, which has become the primary method of making theoretical velocity attenuation calculations. These published observations lead to the question of the effect of radiation on the velocity attenuation in a tube with highly reflective walls such as might be employed in a propulsion system. The approximate blast wave theory is then adapted in developing a modified approximate method for calculating the effect of radiation on shock velocity attenuation. Approximate radiation equations are combined with the velocity attenuation equations and a study is made of factors which might influence the velocity attenuation by radiation. It is concluded that radiation will be an important factor only for strong shocks moving into a dense gas (approximately 1/10 atmosphere or greater and room temperature). A description of the electromagnetic shock tube is given, and some of the velocity attenuation experiments which are being conducted are discussed. No attenuation due to radiation has been noted. These experiments conducted at low velocities and densities thus agree with the predictions of the approximate blast wave theory modified to account for radiation effects. (Author)

10. FUELS AND COMBUSTION

AD-277 028 Div. 10
(TISTM/TCG) OTS price $8.60

Monsanto Research Corp., Dayton, Ohio.
A RESEARCH PROGRAM FOR UNDERSTANDING THE MECHANISMS OF FLAME INHIBITION.
Final rept., Dec 60-30 Nov 61,
by G. B. Skinner, D. R. Miller and others.
Mar 62, 90p. incl. illus. tables, 17 refs.
(Contract AF 33(616)7757, Proj. 6075)
(ASD TR 61-717) Unclassified report

DESCRIPTORS: *Flames, *Combustion - Oxidation inhibitors, *Hydrogen - Flames, *Flame propagation. Theory, Air, Mixtures, Effectiveness, Hydrocarbons, Metallic compounds, Chlorides, Bromine compounds, Fluorocarbons, Ethanes, Iron compounds, Carbonyl radicals, Ignition, Hydrazines, Nitrogen compounds, Tetroxides, Spectrographic analysis, Shock tubes, Schlieren photography, Chemical reactions.

The effects of inhibitors on the H-air reaction were studied by measuring flame speeds of H-air-inhibitor mixtures, and utilizing spectroscopic and shock tube techniques. The best inhibitors were hydrocarbons as a group, several metallic chlorides, 1,2-dibromotetrafluoroethane, and iron carbonyl. Tentative explanations for the effectiveness of these inhibitors were advanced, based on the experimental results and background information from the literature. Screening experiments gave no inhibitors for the spontaneous ignition of N_2H_4 in N_2O_4. The products of the non-flame reaction between N_2H_4 and dilute N_2O_4-air mixtures were identified as NH_4NO_3, while NH_2, NH and OH free radicals were observed spectroscopically in the N_2H_4-N_2O_4 diffusion flame. (Author)

AD-277 041 Div. 10
(TISTA/SEB) OTS price $5.60

Jet Propulsion Center, Purdue U., Lafayette, Ind.
EFFECTS OF RADIAL ENERGY RELEASE VARIATIONS ON TRANSVERSE COMBUSTION PRESSURE OSCILLATIONS.
Interim rept. no. 5,
by J. R. Osborn and J. R. Rahon. Mar 62, 46p. incl. illus. tables, 11 refs. (Rept. no. I-62-3)
(Contract Nonr-110021)
Unclassified report

DESCRIPTORS: *Combustion - Stability, *Gaseous rocket propellants. Rocket motors, Ethylenes, Air, Oscillation, Pressure, Test methods, Test equipment, Tests, Theory, Mathematical analysis, Fuel injection, Energy.

A gaseous bipropellant rocket motor was operated utilizing ethylene and air. The motor was of fixed geometry and had an injector which provided for controlled proportions of the total propellant flow to be injected at various radial locations. Operation was accomplished with three types of energy release distribution and the resultant oscillations observed and recorded. It was determined that the mode and severity of the observed transverse combustion pressure oscillations were a function of the location of the energy release (propellant injection) and the frequency of the excited modes. From these observations, it was concluded that a balance could be achieved wherein two modes could be excited with equal vigor and their resultant interaction would produce stable operation. (Author)

AD-277 299 Div. 10
(TISTA/GEC) OTS price $4.60

Instituto Nacional de Tecnica Aeronautica (Spain).
ON THE INFLUENCE OF CHEMICAL KINETICS ON THE COMBUSTION OF FUEL DROPLETS,
by Carlos Sanchez Tarifa. 10 Mar 62, 24p. illus. 13 refs. (Technical note no. 5)
(Contract AF 61(052)221)
(AFOSR-2836) Unclassified report

Presented at the International Congress of Combustion Engines, Copenhagen, June 1962.

DESCRIPTORS: *Combustion - Reaction kinetics, *Fuels - Drops. Flames, Theory, Tests, Mathematical analysis, Test methods, Gasoline, Kerosene, Heptanes, Ethyl radicals, Alcohols, Fuel sprays, Liquid rocket propellants.

The influence of chemical kinetics on the combustion of fuel droplets is studied by means of a theoretical model of the process which considers spherical symmetry and quasi-stationary conditions. Chemical kinetics is approximated by means of a second-order over-all reaction rate. Results are expressed as a function of the product pr sub s, where p is the pressure and r sub s the droplet radius. It is shown that there exists a minimum value of such product under which an individual droplet cannot sustain a flame. An experimental investigation was also carried out, by burning in air at variable pressure fuel droplets suspended of thin quartz fibres. The laws of variation of both flame and droplet diameter as functions of time were obtained as well as the minimum values of the droplet diameters for combustion as a function of pressure. It is shown that all experimental results are in excellent qualitative agreement with those predicted by theory. (Author)

.11. GROUND TRANSPORTATION EQUIPMENT

AD-277 278 Div. 11
(TISTE/CDM) OTS price $3.60

Army Arctic Test Board, Fort Greely, Alaska.
SERVICE TEST OF WINTERIZATION KIT FOR TRUCK, UTILITY, 1/4-TON, 4x4, M151.
9 June 62, 35p. incl. illus. tables.
(Proj. no. ATB 2-232)
Unclassified report

DESCRIPTORS: *Winterization kits, *Cargo vehicles, *Vehicle heaters, *Protective coverings. Arctic regions, Tests, Reliability, Maintenance, Installation, Military requirements.

Service tests of the winterization kit for the M151 utility truck were conducted to determine its suitability for Army use under arctic winter conditions. The kit consists of an aluminum hardtop enclosure and a (-65 F) vehicle winterization kit. The test kit was designed to permit starting of the vehicle engine, satisfactory vehicle operation, and crew comfort at temperatures as low as -65 F. The kit was subjected to as wide a range of temperature and weather conditions as were available. Performance data were obtained at temperatures as low as -62 F.

During the tests, ambient temperatures and weather conditions existing prior to, during, and after applicable phases of each individual test were recorded. Results of the tests are presented. (Author)

12. GUIDED MISSILES

AD-277 070 Div. 12
(TISTW/RD) OTS price $10.10

Hughes Aircraft Co., Fullerton, Calif.
MISSILE INTEGRATION TERMINAL EQUIPMENT AN/GSA-37.
Final engineering rept.
30 Apr 62, 112p. incl. illus. tables (Rept. no. FD 62-152)
(Contract DA 36-039-sc-86639)
Unclassified report

DESCRIPTORS: *Guided missiles - Communication systems, *Antiaircraft defense systems, *Data transmission systems. Guided missile batteries, Combat information centers, Automatic, Telephone communication systems, Multiplex transmission, Ground support equipment, Surface to air, Coding, Digital systems, Trigger circuits, Triggered gates, Radar stations, Voice communication systems, Data storage systems, Radar tracking.

A Missile Integration Terminal Equipment AN/GSA-37 (MITE) is described. It serves as a two-way automatic data and communications link between a command center and a missile firing battery. The battery units served by MITE include the Nike-Ajax, Nike-Hercules, and Hawk guided missile batteries. The radar tracking stations receive radar information from associated radar sets and transmits this information to the Radar Netting Stations (RNS) via the automatic data link (ADL). The RNS transmits ADL messages to and receives ADL messages from the fire units through the MITE. One MITE, is used for each fire unit under the control of the Radar Netting System. When the MITE is integrated into the Radar Netting System, various types of information flow between the RNS and the MITE. This information is transmitted by means of ADL and voice communication circuits. Tactical information originated at the RNS, as well as various commands and track position information, is sent to the MITE. (Author)

AD-277 139 Div. 12, 15
(TISTP/WH) OTS price $1.10

RIAS, Inc., Baltimore, Md.
ON AUTOMATIC CONTROLS,
by S. Lefschetz. Mar 60, 6p. refs. (Technical rept. no. 60-9)
(Contract AF 49(638)382)
(AFOSR TN 60-230)
Unclassified report

DESCRIPTORS: *Control systems, *Automation. Matrix algebra, Nonlinear systems, Stability, Functions.

The problem of automatic controls is treated, taking into account the nonlinearity of the regulated system. Certain consequences of this nonlinearity are also made clear. (Author)

AD-277 140 Div. 12, 5
(TISTA/WAW) OTS price $9.10

Scientific Analysis Corp., Concord, Mass.
SATELLITES FOR COMMERCIAL LONG-RANGE COMMUNICATIONS,
by Arnold M. McCalmont. June 61, 93p. incl. illus. 44 refs.
Unclassified report

DESCRIPTORS: *Satellite vehicles - Radio relay stations, *Radio communication systems - Satellite vehicles, *Radio relay systems. Military requirements, Reliability, Costs, Radio jamming, Microwaves, Transmission, Propagation, Noise (Radio), Radio interference, Atmosphere, Satellite vehicle trajectories, Booster rockets, Microwave relay systems, Radio repeaters.

Contemporary long-range communications systems and their limitations are introduced as a basis for developing general system requirements. Various proposed communications satellite systems and their possible limitations are discussed in relation to the need for reliability, quality, speed of operation, capacity, flexibility, economy, security, and jamming. Simplified astronautics and booster considerations are discussed prior to delineating satellite and ground station requirements. Proposed commercial systems are presented prior to introducing conclusions. Based on available information, conclusions are reached which indicate there is a useful role for commercial communication satellites and that they are economically feasible. Communications using passive satellites in orbit of the three to five thousand mile category should be the first step in the system. Eventually the communications satellite systems would evolve into one system using active repeaters in 24-hour stationary orbit. (Author)

AD-277 189 Div. 12, 1
(TISTA/WAW) OTS price $23.50

Office of Naval Research, Washington, D. C.
INVESTIGATION OF NONLINEAR CONTROL SYSTEMS.
PART 3. SPECIAL PROBLEMS OF CONTROL THEORY,
by Nicholas Minorsky. Mar 62, 1v. incl. illus. 23 refs.
Unclassified report

DESCRIPTORS: *Servo systems - Mathematical analysis, *Control systems - Mathematical analysis, *Nonlinear systems - Mathematical analysis, *Servomechanisms - Mathematical analysis. Hydraulic servomechanisms, Automatic pilots, Digital computers, Analog computers, Gyroscopes, Compasses, Statistical analysis, Synthesis, Integrators, Photoelectric cells.

Contents:
Statistical theory of control processes
Synthesis of control systems on the basis of average quadratic error
Functional transformers and analogues
Theory of invariance
Theory of nonlinear servomechanisms
Mathematical theory of optimizing processes
Adaptive control (elementary theory)

AD-277 206 Div. 12, 26
(TISTW/EET) OTS price $7.60

Space Technology Labs., Inc., Redondo Beach, Calif.
MISSILE/LAUNCH COMPLEX AS-A-UNIT MODELS, FOR THE DETERMINATION OF WEAPON SYSTEM CAPABILITY,
by A. J. Monroe. 4 May 62, 72p. incl. illus. 13 refs. (Rept. no. 6301-6237-TU-000)
(Contract AF 04(694)3)
(BSD TDR 62-74) Unclassified report

DESCRIPTORS: *Guided missiles - Maintenance. Surface to surface, Maintenance, Reliability, Probability, Statistical analysis, Mathematical prediction, Vector analysis, Scheduling, Matrix algebra, Ground support equipment.

Probabilistic measures of a weapon system in terms of the concepts of state vectors and transition matrices are explored. The report first defines, and then presents a general methodology for computing alert readiness, EWO interval availability, EWO pointwise availability, and EWO reliability. All of the developments presented are for equipments which may be termed single unit; that is, it is assumed that an equipment is tested and passed (or replaced) as a unit. Continuous monitoring and periodic maintenance policies are considered. (Author)

AD-277 221 Div. 12
(TISTA/VGW) OTS price $4.00

Systems Technology, Inc., Inglewood, Calif.
SINGLE-AXIS ATTITUDE REGULATION OF EXTRA-ATMOSPHERIC VEHICLES,
by R. A. Peters, V. J. Kovacevich, and Dunstan Graham. Feb 62, 238p. incl. illus. tables, 12 refs.
(Contract AF 33(616)5961, Proj. 8219)
(ASD TR 61-129) Unclassified report

DESCRIPTORS: *Satellite attitude - Control systems, *Space flight - Stabilization systems, *Control systems - Mathematical analysis. Design, Military requirements, Stability (Lateral), Stability (Longitudinal), Servo systems, Satellite vehicles, Equations, Tables, Gyro stabilizers, Jets, Torque, Spaceships.

Three-degree-of-freedom rotational equations of motion characterizing an extra-atmospheric vehicle are simplified for single axis motions only. Linear analyses are made in which the simplified vehicle motions are controlled by a variety of automatic control systems using inertial wheels and/or mass ejection. Nonlinear control of the same vehicle is then considered using phase plane analysis. Equalization and several types of realistic nonlinearities are considered, and such quantities as maximum attitude, attitude rate, and power expended during a corrective maneuver are determined. The effects of controller type, i.e., inertial wheel or mass ejection, equalization, and various nonlinearities upon limit cycle behavior and upon the impulse expended in a limit cycle condition are developed in literal terms, and a summary is given. The analysis evolves from simple to more complex and realistic cases so as to illustrate methods and concepts which can be used at a preliminary design level. Examples are given of tradeoffs illustrating how the controller-vehicle may be optimized with respect to one or more dynamic requirements, such as speed of response, impulse expenditure, and accuracy. (Author)

AD-277 273 Div. 12, 25, 9
(TISTA/VGW) OTS price $1.60

AVCO Everett Research Lab., Mass.
APPLICATIONS OF MHD TO RE-ENTRY VEHICLE CONTROL,
by Richard H. Levy and James E. Hayes. Mar 62, 14p. incl. illus. 5 refs. (Research note no. 289)
(Contract AF 04(694)33)
(BSD TDR 62-59) Unclassified report

DESCRIPTORS: *Re-entry vehicles- Control systems, *Re-entry aerodynamics - Plasma physics, *Gas ionization - Magnetohydrodynamics. Lunar probes, Flaps, Control surfaces, Coils, Superconductivity.

The application of magnetohydrodynamic (MHD) devices to re-entry vehicle control requires estimation of the values of certain critical parameters along typical re-entry trajectories. A map giving the values of the interaction parameter, magnetic Reynolds number, Hall coefficient, ion slip parameter and ratio of magnetic to aerodynamic pressure is presented and evaluated. These parameters allow one to assess the types of interaction possible between magnetic fields and the flow. Flow calculations are presented of the interaction between the magnetic field due to either wires or coils below the surface and an ionized gas flow. Initially channel flow calculations were made to simulate the flow between a surface and a shock wave, and later more realistic geometries were considered. The force on the wire or coil and the resulting change in pressure and surface heating on the wall are calculated. The possibility of finding practical applications such as the magnetic flap, for these interactions between magnetic fields and ionized gas flow depends strongly on the weights necessary to produce the magnetic fields required by the calculations. The development of superconducting coils makes the production of strong magnetic fields for relatively small weights possible. Estimates are given for the weights of superconducting coils required to produce the needed field strength. (Author)

AD-277 275 Div. 12, 2
(TISTW/RD) OTS price $2.60

Allied Research Associates, Inc., Boston, Mass.
INTERPRETATION OF TIROS II RADIATION MEASUREMENTS.
Final rept.,
by Raymond Wexler. 31 May 62, 24p. incl. illus. tables, 16 refs.
(Contract AF 19(604)5968, Proj. 6698)
(AFCRL 62-638) Unclassified report

DESCRIPTORS: *Satellite vehicles - Meteorology. Infrared radiation, Atmosphere, Albedo, Solar atmosphere, Clouds, Cloud height indicators, Blackbody radiation, Meteorology, Meteorological instruments, Infrared detectors, Airborne.

Transmissions due to different atmospheric gases for TIROS infrared sensors are computed. The relations between Channel 2 radiation and surface temperature, and Channel 4 and total radiation are derived from representative radiosonde ascents. The variation of Channel 2 and 4 radiation with air mass is derived from selected orbits of TIROS II and compared with theoretical calculations. A discrepancy exists between theoretical and observed limb darkening. A comparison between the observed and theoretical relations for Channels 2 and 4 indicates either an error in the relative calibrations or that the effect of atmospheric absorption on Channel 4 in relation to Channel 2 is greater than that determined empirically from laboratory data. A preliminary comparison is made of albedos deduced from Channel 3 observations with surface temperatures determined from Channel 2 observations. The albedos appear appropriate to clear, partial cloudy and overcast conditions. A comparison of Channel 2 observations with synoptic weather conditions shows an excellent fit in the locations of clear and high overcast areas. (Author)

AD-277 353 Div. 12, 9
(TISTA/WAW) OTS price $4.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
EFFECT OF VARYING AIR DENSITY ON THE NONLINEAR

Division 13 - INSTALLATIONS AND CONSTRUCTION
Division 14 - MATERIALS (NON-METALLIC)

PITCHING AND YAWING MOTION OF A SYMMETRIC MISSILE,
by Charles H. Murphy. Feb 62, 48p. incl. illus. 12 refs. (BRL rept. no. 1162)
(DA Proj. 503-03-001)
Unclassified report

DESCRIPTORS: *Guided missiles - Re-entry aerodynamics, *Re-entry vehicles - Re-entry aerodynamics, *Re-entry aerodynamics - Mathematical analysis. Atmosphere entry, Atmosphere, Air, Density, Hypersonics, Aerodynamics, Stability, Pitch, Yaw, Differential equations, Integral equations, Perturbation theory, Mathematical prediction, Surface to surface.

Although the effect of an exponentially varying air density on the angular motion of a re-entering missile has been intensively studied for linear aerodynamic moments, this effect for nonlinear moments has only been investigated by a quasi-linear technique and this work was limited to planar motion. In this report, various modifications of the quasi-linear analysis for a cubic static moment are compared with the exact solutions and the best of these used to determine the general effect of varying density on combined pitching and yawing motion. Next the perturbation method which makes use of the exact solution for a cubic static moment is considered and the necessary modifications introduced by the varying density are made. The predicted density-gradient-induced damping for planar motion is determined for both theories and compared with the numerical integration of the exact differential equation. The perturbation prediction is found to be superior. (Author)

AD-277 356 Div. 12, 19
(TISTA/VGW) OTS price $2.60

California U., Los Angeles.
A COMPARISON OF ASTRONOMICAL AND BALLISTIC TRADITIONS IN ORBIT CORRECTION,
by Samuel Herrick. May 62, 24p. 10 refs.
(Astrodynamical rept. no. 14)
(Contract AF 49(638)498)
Unclassified report

International Union of Theoretical and Applied Mechanics, International Symposium on the Dynamics of Satellites, Paris, May 28-30, 1962.

DESCRIPTORS: *Space flight - Flight paths, *Orbital flight paths - Mathematical analysis, *Satellite vehicle trajectories. Spaceships, Celestial mechanics, Exterior ballistics, Errors, Perturbation theory, Partial differential equations, Mathematical prediction, Satellite rendezvous vehicles, Vector analysis, Space navigation.

A mathematical study is presented of differential formulae, which are useful in the mathematical differential correction of an approximate orbit into better agreement with observation, in the physical or thrust differential correction of a non-rendezvous trajectory into one that intercepts its target, in guidance, in error analysis, and in optimization. The discussion is limited to a comparison of astronomical differential correction methods with the adjoint method that has come into space navigation from ballistics. (Author)

AD-277 446 Div. 12, 28
(TISTA/WAW) OTS price $1.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
OPTIMIZATION OF MANNED ORBITAL SATELLITE VEHICLE DESIGN WITH RESPECT TO ARTIFICIAL GRAVITY.
Master's thesis. Rept. on Human Performance in Advanced Systems,
by Benjamin J. Loret. Dec 61, 46p. incl. illus. 41 refs.
(Proj. 7184)
(ASD TR 61-688) Unclassified report

DESCRIPTORS: *Satellite vehicles - Human engineering, *Theses, *Gravity - Simulation. Manned, Design, Dynamics, Rotation, Airframes, Military requirements, Maintenance, Safety, Space environmental conditions.

A design envelope is established as the result of a human factors analysis of the artificial gravity environment peculiar to rotating space vehicles. The envelope is prescribed by: an upper limit on vehicle angular velocity of 0.4 radian/second to minimize the occurrence of ''canal sickness''; a basic upper limit on artificial gravity of 1 g; and a basic lower limit on artificial gravity of 0.2 g as the lowest value of g at which man can walk unaided. Both g-limits are modified to compensate for Coriolis forces which cause variation in g-level for tangential walking inside the rotating vehicle. An upper limit on vehicle radius of 180 feet is established on the basis of engineering practicality. The optimum vehicle configuration is established as a Modified Axially Expanded Dumbbell, characterized by a single, cylindrical, living-working compartment oriented parallel to the spin axis, counterbalanced by other vehicle components. The configuration is illustrated in the conceptual Pseudo-Geogravitational Vehicle, which has a radius of 180 feet and an operational angular velocity of 0.4 radian/second to produce 0.9 g in the living-working compartment. (Author)

13. INSTALLATIONS AND CONSTRUCTION

No Entries

14. MATERIALS (NON-METALLIC)

AD-277 062 Div. 14
(TISTM/REB) OTS price $4.60

Borden Chemical Co., Philadelphia, Pa.
STUDY LEADING TO THE DEVELOPMENT OF HIGH TEMPERATURE RESISTANT ADHESIVES.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 62,
by K. C. Tsou, H. E. Hoyt and B. D. Halpern.
31 Mar 62, 42p. incl. illus. tables, 8 refs.
(Contract DA 36-034-ORD-3501)
Unclassified report

DESCRIPTORS: *Resin adhesives, *Thermosetting resins, *Heat resistant polymers - Synthesis, *Adhesives. Polymers, Copolymerization, Polymerization, Methyl radicals, Phenols, Bromides, Methanes, Epoxides, Oxides, Stainless steel, Stability, Spectrographic analysis, Molecular structure, Phenyl radicals, Allyl radicals.

The copolymer of 2,6-dimethyl-4-bromophenol and 2-methyl-6-allyl-4-bromophenol (50:50) has been shown to slowly thermoset and give increased bonding strength when held at 500 F. This copolymer can be compression molded in the form of discs and its hardness increased with time of heating. Evaluation of adhesive strength of this copolymer was made; shear strength was 738 psi at 500 F, after 1/2 hour at this temperature. The copolymer was converted to the epoxide derivative by peracetic acid in chloroform. Peracetic acid degraded polyxylenol as evidenced by the viscosity change. This finding provides basis for the study of oxidative degradation of the polymer. Difficulty in making the allyl-containing polymers at higher molecular weight levels was found to be related to impurities in the allyl monomer, 2-methyl-4-bromo-6-allyl phenol. Polyxylenol was chromatographically separated on large scale and the fractions employed in bonding stainless steel. Copolymers of 4,4'-dibromo-2,2'-dimethyl-6,6'-bismethylene phenol with bromoxylenol and with 2-methyl-4-bromo-6-allyl phenol were prepared, as well as the homopolymer from 2-methyl-4-bromo-6-(alpha-methallyl) phenol and copolymer with bromoxylenol (Author)

AD-277 068 Div. 14, 26
(TISTM/BRW) OTS price $3.60

General Electric Co., Evendale, Ohio.
HIGH STRENGTH GLASS FIBERS DEVELOPMENT PROGRAM. Final rept.,
by D. L. Hollinger and H. T. Plant. 16 May 62, 36p. incl. illus. tables.
(Contract NOw 61-0641-c)
Unclassified report

DESCRIPTORS: *Glass textiles, *Fibers. Filament wound construction, Mechanical properties, Drawing (Machine processing), Resins, Coatings, Temperature, Laminates, Reinforcing materials, Plastic coatings, Stresses, Corrosion, Moisture, Water vapor, Tensile properties, Production, Composite materials, Abrasion, Tests.

Attempts were made to produce filament wound rings from E-glass monofilament and epoxy resin in such a way that weakening of the fiber from mechanically induced surface damage and corrosion from water vapor was minimized. Glass stress in such rings ranged as high as 352,000 psi but did not equal the single fiber tensile strength for E-glass which has been reported elsewhere as high as 600,000 psi. It is concluded that attention needs to be directed toward the specific conditions affecting the glass surface in ring structures which are not present in single fiber tensile tests. (Author)

AD-277 080 Div. 14, 4
(TISTM/TCG) OTS price $.75

Rock Island Arsenal Lab., Ill.
THERMAL STABILITY OF ALIPHATIC DIESTERS,
by R. LeMar. 20 Feb 62, 24p. incl. illus. tables, 4 refs. (Rept. no. 62-653)
(Proj. 593-21-061)
Unclassified report

DESCRIPTORS: *Hydraulic fluids, *Esters, *Stability - Fluids. Ethyl radicals, Butyl radicals, Dibasic acids, Sebacic acid, Temperature, Viscosity, Colors, Corrosive liquids, Decomposition, Copper, Aluminum, Nickel alloys, Steel.

The thermal stability of the ethyl and n-butyl diesters of adipic and sebacic acid was evaluated at 475 F under N in the presence of four metals (in and above the fluid) for several time periods. Di-2-ethylhexyl sebacate was tested for comparison purposes. Changes in several physical and chemical diester properties and metal specimen weights were determined after exposure. The adipates showed greater stability as regards changes in viscosity, neutralization number, and weight of immersed steel specimen that did the sebacates. The reverse was true as regards changes in color, precipitate volume, and degree of carbonization. The longer-chain sebacates sublimed large amounts of acidic material onto cooler regions of the test cell. None of the diesters were corrosive to specimens in the gas phase, although staining did occur. None of the diesters were corrosive to immersed Cu, Al or monel metal during exposure. All were corrosive to immersed steel. Comparison of these results with results from similar tests on two diesters with steel omitted, show that steel and the diesters have a mutually deleterious effect. (Author)

AD-277 187 Div. 14
(TISTW/RD) OTS price $1.60

Naval Missile and Astronautics Center, Point Mugu, Calif.
AEROMEDICAL APPRAISAL OF F4H-1/SPARROW III WEAPON SYSTEM,
by G. G. Lucchina and C. G. Phipps. 29 June 62, 14p. incl. illus. (Technical memo. no. NMC-TM-62-16)
(WEPTASK RM-37210)
Unclassified report

DESCRIPTORS: *Protective clothing, *Pressure suits, Guided missiles, Air to air, Physiology, Jet fighters, Pilots, Radar operators, Naval aircraft, Biological environment, Guided missile personnel.

Aeromedical appraisal of the F4H-1F/SPARROW III weapon system was undertaken to detect any weakness in the human factor as part of the weapon system complex. Results of a questionnaire submitted to pilots and radar operators regarding deficiencies in the Mark IV full pressure suit are discussed. Problems arose in respect to mobility in the pressurized state, visibility, and in mating the g-suit hose with the full pressure suit. Recommendations for solutions to the problems are included. In-flight monitoring of physiologic parameters was accomplished and a discussion of results is included with implications to possible detrimental effects on participants. (Author)

AD-277 402 Div. 14, 25
(TISTM/EJH) OTS price $3.60

Polymer Research Inst., U. of Mass., Amherst.
THE DYNAMIC BIREFRINGENCE OF HIGH POLYMERS II,
by Richard S. Stein, S. Onogi and others.
30 Apr 62, 12p. illus. (AF Progress rept. no. 4; ONR technical rept. no. 44)
(Contract Nonr-335700, Proj. NR 356-378 and Grant AF-AFOSR-61-28)
Unclassified report

DESCRIPTORS: *Polymers - Optics, *Ethylenes, *Refraction. Crystals, Films, Relaxation time, Stresses, Light, Scattering, Theory, Deformation, Plastics.

The time-dependence of birefringence was investigated in experiments involving relaxation at constant strain, extension at constant rate of strain, and periodically varying strain. The results of constant strain relaxation are calculated using the linear phenomenological theory of birefringence relaxation. Strain-optical coefficient spectra are calculated for a number of low and high density polyethylenes and characteristics of the spectra are correlated with sample density. A simple molecular theory is presented. The time-dependence of birefringence is believed to arise principally from the finite relaxation time for crystal orientation. (Author)

AD-277 405 Div. 14, 25
(TISTM/REB) OTS price $2.60

Polymer Research Inst., U. of Mass., Amherst.
THE KINETICS OF CRYSTALLIZATION OF POLYPROPYLENE FRACTIONS AND OF POLYBUTENE-1, PART I,
by S. Hoshino, Joseph Powers, and R. S. Stein.
20 Apr 62, 22p. incl. illus. 11 refs. (ONR Technical rept. no. 43)
(Contract Nonr-335700, Proj. NR 356-378)
Unclassified report

DESCRIPTORS: *Polymers - Crystallization, *Propenes, *Butenes. Reaction kinetics, Theory, Microphotography, Crystals, Growth.

An apparatus, devised for obtaining microphotographs of spherulites of a crystallizing polymer at carefully controlled temperature and in a programmed time sequence, was used to study a series of polypropylene fractions differing in tacticity. Nucleation and radial growth rates were obtained as a function of extent of crystallization, and degree of supercooling. This was compared with over-all crystallization rates determined dilatometrically (in another laboratory) on these same fractions. The implication of these results is discussed in terms of current theories of crystallization. Similar studies on polybutene-1 are also reported. Variations of spherulite appearance with time during isothermal annealing are reported. (Author)

AD-277 406 Div. 14, 25
(TISTM/REB) OTS price $1.60

Polymer Research Inst., U. of Mass., Amherst.
THE LOW ANGLE LIGHT SCATTERING OF POLYTETRAFLUOROETHYLENE FILMS,
by Marion B. Rhodes and Richard S. Stein.
24 May 62, 10p. incl. illus. 6 refs. (ONR Technical rept. no. 45)
(Contract Nonr-335700, Proj. NR 356-378)
Unclassified report

DESCRIPTORS: *Fluorides - Optics, *Polymers - Optics, *Ethylenes, *Films, *Light - Scattering.

Low-angle light scattering patterns from polyethylene and polytetrafluoroethylene (PTFE) using V sub v polarization (parallel polarization and analyzer) and H sub v polarization (crossed polarizer and analyzer) are presented. The difference in appearance is evident and is interpretable in terms of morphological differences between these 2 polymers. Attempts are made to interpret the PTFE scattering pattern and relate it to the known morphology of PTFE. Experimental evidence indicated that the scattering entities are aggregates of the crystals in which the crystals are arrayed at a preferred angle with respect to the direction of maximum extension of the aggregate. Patterns obtained with stretched PTFE films are consistent with the orientation of the aggregate with its longest dimension lying along the stretching direction accompanied by a decrease in the angle between the aggregate axis and the principal polarizability direction.

AD-277 415 Div. 14, 17
(TISTM/BRW) OTS price $5.60

Ordnance Materials Research Office, Watertown, Mass.
A REVIEW OF MATERIALS RESEARCH FOR 1961 OF THE ORDNANCE MATERIALS RESEARCH OFFICE,
ed. by Samuel J. Acquaviva. June 62, 56p.
136 refs. (OMRO pub. no. 23)
Unclassified report

DESCRIPTORS: *Materials - Bibliography, *Bibliography - Materials. Alloys, Metals, Coatings, Plastics, Adhesives, Ceramic materials, Welding, Rubber, Plating.

Contents:
Adhesives
Analysis and measurement
Cleaning, preserving materials and fungus studies
Coatings, inorganic
Coatings, organic
Corrosion studies
Metals
  Ferrous
  Nonferrous
High-temperature materials
Nondestructive tests
Packaging
Physics, solid state
Plastics
Rubber
Welding

AD-277 420 Div. 14
(TISTM/REB) OTS price $6.60

General Mills, Inc., Minneapolis, Minn.
INVESTIGATION OF THE USE OF ISOCYANATE ADDUCTS IN URETHANE FOAM.
Final technical rept., 22 Dec 60-21 Jan 62,
by A. F. Reilly and L. M. Zwolinski. 22 Jan 62, 66p. incl. illus. table, 56 refs. (Rept. no. 2258)
(Contract DA 19-129-qm-1727, Proj. 7x93-30-001)
Unclassified report

DESCRIPTORS: *Expanded plastics, *Foams, *Urethanes, *Cyanates. Synthesis, Chemical reactions, Physical properties, Stability, Production.

The feasibility of a one-can, delayed action foaming system was successfully demonstrated. A literary search revealed that many compounds possessing active hydrogens may react with organic isocyanates to produce heat-sensitive adducts. These adducts yield back the original isocyanate and the blocking agent when heated. About 12 blocking agents were tested by preparing monomeric isocyanate adducts. p-Nonylphenol, diethyl malonate, ethyl acetoacetate and tert-butyl alcohol were most attractive for use as blocking agents in delayed-action foaming systems. Two stable, one-can, delayed-action foaming systems were developed. A rigid, delayed-action system was developed which made use of tertbutyl alcohol as a blocking agent. A

partially blocked, quasi-prepolymer - containing boric acid as an auxiliary blowing agent, a foam stabilizer, and a catalyst - was stable at room temperature. When heated above 150 C, it produced a rigid foam. A flexible, delayed-action foam system was developed which utilized p-nonylphenol to completely block a flexible total prepolymer. This system, heated above 170 C, produced a fully cured, flexible polyurethane foam. (Author)

AD-277 450 Div. 14, 1
(TISTM/EJH) OTS price $1.60

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
THE DEVELOPMENT OF A SPECIFICATION FOR A PRE-WAX CLEANER-POLISH FOR USE ON SOILED AND WEATHERED PAINTED AIRCRAFT SURFACES,
by A. J. Koury and S. A. Matuska. 21 May 62, 13p. incl. illus. tables, 3 refs. (Rept. no. NAMC AML 1438)
Unclassified report

DESCRIPTORS: *Abrasives, *Metal polishes, *Airframes - Cleaning, *Airplane panels. Specifications, Aircraft finishes, Surfaces, Carbon removing compounds, Cleaning fluids, Physical properties, Chemical properties, Abrasion, Test methods, Paints, Varnishes.

The development of a specification for pre-wax cleaning compounds is described. These compounds will efficiently and expeditiously remove soil from weathered painted surfaces without any deleterious effects on the materials used in aircraft construction and will leave no residual oily film to interfere with the subsequent application of MIL-W-18723 waxes. Included are requirements and test methods for defining and evaluating these compounds, to be incorporated in a procurement specification. (Author)

AD-277 466 Div. 14, 26
(TISTM/BRW) OTS price $3.00

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
INVESTIGATION OF SPRAYABLE, STRIPPABLE BARRIER MATERIALS FOR STORAGE AND OVERSEAS SHIPMENT OF NAVAL WEAPONS SYSTEMS,
by D. V. Minuti. 9 Feb 62, 53p. incl. illus. tables, 12 refs. (Rept. no. NAMC AML 1346)
Unclassified report

DESCRIPTORS: *Coatings - Specifications, *Packaging - Materials. Naval ordnance, Weatherproofing, Storage.

A review of specifications covering sprayable, strippable coatings, viz., MIL-B-3038, MIL-B-6030, MIL-C-6799, MIL-S-8141, MIL-B-12121, and MIL-C-16555 revealed that in many instances the requirements and test methods were duplicated. A specification was developed incorporating many of the established procedures along with several modified and newly developed methods to predict the performance of sprayable, strippable barrier materials in their intended use. Six materials manufactured by five companies and representing eight coating systems were evaluated for conformance to the proposed consolidated specification. Only two coating systems, representative of proposed Type II materials, conformed to all the requirements of the proposed specification. (Author)

AD-277 478 Div. 14, 7, 8
(TISTM/BRW) OTS price $2.60

Clevite Corp., Cleveland, Ohio.
FAILURE MECHANISMS IN CERAMIC DIELECTRICS.
Quarterly technical note no. 1,
by R. Gerson. 15 Apr 62, 17p. incl. illus. tables.
(Contract AF 30(602)2594)
(RADC TDR 62-267) Unclassified report

DESCRIPTORS: *Dielectrics - Failure (Mechanics), *Ceramic capacitors, *Ceramic materials - Synthesis. Preparation, Electrical properties, Ferroelectric crystals, Antiferroelectricity, Barium compounds, Titanates, Zirconates, Lead compounds, Strontium compounds.

Eighteen ceramic compositions of high dielectric constant were prepared. The firing conditions were established, for 16 of these, which would achieve densities high enough for significant degradation tests. The materials are divided among paraelectric, ferroelectric, and antiferroelectric phases, undoped and with n- and p-type additives. The results of routine electrical tests of dielectric constant, dissipation factor, and resistivity from -196 C to 250 C are presented. (Author)

AD-277 486 Div. 14
(TISTM/BRW) OTS price $2.60

General Dynamics/Fort Worth, Tex.
ENGINEERING RESEARCH - DEVELOP FUEL TANK AND PRESSURE CABIN SEALING METHODS FOR HIGH TEMPERATURE USE,
by M. T. Carroll. 10 May 62, 27p. incl. illus. tables (Rept. no. FGT-2704)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Fuel tanks, *Pressurized cabins. Seals, Metal seals, Plastic seals, Fuel seals, High temperature research, Low temperature research, Tests, Test methods, Aircraft.

An investigation was made to develop fuel tank and pressure cabin sealing methods for high temperature use. Various sealing materials and methods for use in the temperature range of -100 to 1000 F were examined, including (1) a fastener test method, and (2) a silicone sealant. Data from a tank sealing evaluation are presented. (Author)

AD-277 492 Div. 14, 27
(TISTM/BRW) OTS price $1.60

High Temperature Materials, Inc., Boston, Mass.
DEVELOPMENT OF BORON PYRALLOY FOR ROCKET MOTOR HARDWARE.
Monthly progress rept. no. 3, 1-31 May 62.
27 June 62, 6p. incl. illus.
(Contract NOw 60-0292)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles - Materials, *Refractory materials, *Boron compounds. Preparation, Oxidation, Tests, Graphite compounds, Pyrolysis.

Production of flat plate material for use in test specimens and nozzle inserts continued. Assembly of the first nozzle insert is about 90% complete. Additional oxidation tests were conducted and analysis of the results is presented. Tensile and creep test specimens for testing are being machined. (Author)

15. MATHEMATICS

AD-277 000 Div. 15
(TISTP/TL) OTS price $3.60

Electronics Research Lab., U. of Calif., Berkeley.
ON THE ROOTS OF A REAL POLYNOMIAL INSIDE THE UNIT CIRCLE AND A STABILITY CRITERION FOR LINEAR DISCRETE SYSTEMS,
by E. I. Jury and J. Blanchard. 26 Dec 61, 28p. incl. illus. tables, 16 refs. (Series no. 60, Issue no. 425)
(Grant no. AF-AFOSR-62-70)
(AFOSR-2443) Unclassified report

DESCRIPTORS: *Polynomials, *Linear systems, *Determinants. Numbers, Algebra, Transformations (Mathematics), Sequences, Tables, Stability, Data, Sampling.

Necessary and sufficient algebraic conditions for the roots of a real polynomial to lie inside the unit circle, in a table form, are given. In this form, the constraints are obtained only by evaluation of second order determinants. The connection and identity between the stability criterion established and of a previously obtained criterion are compared. The table is valuable if the coefficients of the real polynomial are given in numbers. Conditions on the numbers of the roots inside, outside, or on the unit circle are also discussed under the cases when the determinants are zero or non-zero. Necessary and sufficient conditions are formulated for all the roots to be inside a circle of radius sigma or less than unity, and also the conditions when the roots are to lie between plus and minus unity in the z-plane. Various examples from discrete systems are presented which illustrate the applications of the new stability criterion and the other conditions formulated in this report. In the conclusion, the various analytical stability criteria applied to linear discrete systems are compared, with emphasis on the advantageous applications of each of the criteria.

AD-277 027 Div. 15
(TISTP/JW) OTS price $2.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
TABLES AND FORMULAS FOR CALCULATING FOURIER COEFFICIENTS OF POWER-LAW DEVICES,
by Paul Penfield, Jr. 20 Mar 62, 20p. incl. tables (Technical rept. no. 385)
(Contract DA 36-039-sc-78108, Proj. 3-99-00-000)
Unclassified report

DESCRIPTORS: *Fourier analysis. Tables, Functions.

AD-277 045 Div. 15
(TISTP/TL) OTS price $1.60

RAND Corp., Santa Monica, Calif.
GENERATION OF PERMUTATIONS BY ADJACENT TRANSPOSITION,
by Selmer M. Johnson. June 62, 7p. 2 refs.
(Research memo. no. RM-3177-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Combinatorial analysis. Automatic, Operations research, Numerical analysis.

A new method is described for systematically generating all permutations of a set of objects, in which each permutation is formed exactly once, and this is achieved by interchanging the marks in two adjacent positions in the preceding permutation. The procedure has certain advantages of simplicity over other methods and possibly is faster for machine computation. (Author)

AD-277 105 Div. 15
(TISTP/TL) OTS price $4.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
TWO-PERSON MARKOV GAMES,
by G. Elfving. 1 June 62, 40p. incl. illus. table (Technical rept. no. 77)
(Contract Nonr-22552, Proj. NR 342-022)
Unclassified report

DESCRIPTORS: *Probability, *Determinants, *Statistical distributions, *Statistical processes, *Games theory. Sequences, Matrix algebra, Real variables, Sociology, Population.

The present analysis deals with sequential two-person non-zero-sum games in which the players' decisions are based on a fixed number of preceding moves. The decision rules are (in general) independent of time and may include randomization. A notion of social equilibrium is discussed. It applies generally to games where the players are technically in the same position, and a distribution (D) of strategies is required over a population, such that any strategy that appears in D is good against the mixed strategy defined by selecting a strategy in D at random. (Author)

AD-277 106 Div. 15
(TISTP/TL) OTS price $2.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
A CONVERGENT ASYMPTOTIC EXPANSION FOR MILL'S RATIO AND THE NORMAL PROBABILITY INTEGRAL IN TERMS OF RATIONAL FUNCTIONS,
by Harold Ruben. 8 June 62, 20p. 23 refs.
(Technical rept. no. 78)
(Contract Nonr-22552, Proj. NR-342-022)
Unclassified report

DESCRIPTORS: *Functions, *Probability, *Integrals, *Statistical distributions, *Statistical functions. Inequalities, Taylor's series, Integration.

In the present analysis only the normal probability integral together with the associated Mill's ratio is considered. (Author)

AD-277 151 Div. 15
(TISTP/JW) OTS price $6.60

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
AN INTERPRETATION AND EXTENSION OF TUKEY'S ONE DEGREE OF FREEDOM FOR NON-ADDITIVITY.
Rept. on Mathematical Techniques of Aeromechanics,
by H. Leon Harter and Mary D. Lum. Mar 62, 60p. incl. tables, 34 refs.
(Proj. 7071)
(ARL 62-313) Unclassified report

DESCRIPTORS: *Transformations (Mathematics), *Statistical analysis. Analysis of variance, Reliability, Errors, Factor analysis.

An interpretation is given of the test for non-additivity in a two-factor experiment, in which a sum of squares (with a single degree of free-

dom) for non-additivity is separated from the sum of squares for interaction and tested against the residual. The interpretation is as follows: The sum of squares for non-additivity is the sum of squares for linear regression of the sample interaction on the product of the sample main effects; or equivalently, the ratio of the sum of squares for non-additivity to the sum of squares for interaction is the coefficient of determination (the square of the coefficient of correlation) between the sample interaction and the product of the sample main effects. This interpretation remains valid for an extension to experiments with three or more factors. This extension involves the separation, from the sum of squares for each interaction of two or more factors, of a sum of squares (with a single degree of freedom) for non-additivity, which is then tested against the residual for that interaction. Several artificial examples and two examples involving actual data are given. (Author)

AD-277 196 Div. 15
(TISTP/GRW) OTS price $2.60

Princeton U., N. J.
THE METHOD OF LIMITS IN THE THEORY OF INDEX NUMBERS,
by S. N. Afriat. 15 June 62, 20p. incl. illus. (Research paper no. 4)
(Contract Nonr-185816)
Unclassified report

DESCRIPTORS: *Number theory, *Operations research. Economics, Differential equations.

AD-277 255 Div. 15
(TISTP/GRW) OTS price $11.50

Columbia U., New York.
TOPICS IN RIEMANNIAN GEOMETRY. VOLUME I,
by James Eells, Jr. 1961, 1v. refs. (Rept. no. CU-9)
(Contract Nonr-26657)
Unclassified report

Notes of a seminar in differential geometry given at Columbia University in 1960-61.

DESCRIPTORS: *Differential geometry. Algebraic topology.

Contents:
Riemann manifolds with positive sectional curvature
Flat manifolds I
Flat manifolds II
Nilmanifolds
The reducibility theorem of G. de Rham
Totally geodesic submanifolds
The group of isometries of a Riemannian manifold
Killing vector fields

AD-277 351 Div. 15, 9
(TISTA/WAW) OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
THE EXTREMIZATION OF FUNCTIONALS INVOLVING PRODUCTS OF POWERS OF INTEGRALS AND ITS APPLICATION TO AERODYNAMICS,
by Angelo Miele. May 62, 18p. 7 refs. (Flight Sciences Lab. Technical rept. no. 57; Rept. no. D1-82-0162)
Unclassified report

Also available from the author.

DESCRIPTORS: *Calculus of variations, *Integral transforms, *Aerodynamics - Mathematical analysis. Hypersonics, Wings, Fuselages, Design, Bodies of revolution, Conical bodies, Drag, Reduction, Differential equations.

The extremization of functionals involving products of powers of n integrals, each of which depends on the same unknown function y(x) is considered. After the necessary conditions for the extremum are formulated, the extremal arc is shown to be governed by a second order differential equation depending on n undetermined integral parameters. After the general solution is combined with the definitions of the integral parameters and the end-conditions, a system of n + 2 algebraic equations is obtained: it involves n + 2 unknowns, that is, the n undetermined integral parameters and two integration constants. The procedure discussed can be employed in the study of the optimum wings and fuselages for different flow regimes. These problems are generally of the isoperimetric type with variable end-points. However, they can be reduced to problems involving products of powers of integrals whose end-points are fixed if a simple coordinate transformation is performed. In this connection, a particular example is developed. It refers to the problem of the optimum slender body of revolution in Newtonian flow with zero angle of attack for the case where the diameter and the wetted area are given while the length and the volume are free. The solution minimizing the drag is a cone. (Author)

AD-277 367 Div. 15
(TISTP/TL) OTS price $5.60

Electronics Research Lab., U. of Calif., Berkeley.
EQUIVALENT STOCHASTIC SEQUENTIAL MACHINES,
by J. W. Carlyle. 14 Nov 61, 56p. incl. illus. tables, 5 refs. (Series no. 60, Issue no. 415)
(Contract Nonr-22253)
Unclassified report

DESCRIPTORS: *Statistical processes, *Sequences, *Machines, *Probability, *Determinants, *Matrix algebra. Statistical distributions, Vector analysis, Real variables, Inequalities, Statistical functions, Communications theory, Memory devices.

This analysis is concerned with some structural properties of the probabilistic finite-state machines which were introduced as models for noisy communication channels. Procedures are given for the detection and elimination of superfluous states in machine descriptions. The point of view can be regarded as a probabilistic analog of deterministic finite-state machines. The equivalent states of a stochastic machine can be merged, as in the deterministic case, to yield a reduced form. Deterministic machines have unique reduced forms, but stochastic machines may possess a family of distinct reduced forms; a computational procedure for the determination of this family is discussed and some examples are given. (Author)

AD-277 389 Div. 15
(TISTP/GRW) OTS price $8.10

Illinois U., Urbana.
NUMERICAL STUDIES ON RECENT IMPROVEMENTS OF THE MINKOWSKI-HLAWKA THEOREM.
Technical rept.,

Division 16 - MEDICAL SCIENCES

by Roderick Peter Campbell Caldwell. 1962, 81p. 16 refs.
(Contract Nonr-183418, Proj. NR 043-194)
Unclassified report

DESCRIPTORS: *Matrix algebra, *Integral equations, *Numerical analysis.

AD-277 488 Div. 15
(TISTP/TL) OTS price $1.60

Hebrew U. (Israel).
TAUBERIAN CONSTANTS FOR THE ABEL AND CESARO TRANSFORMATIONS,
by A. Jakimovski. Mar 62, 15p. (Technical (Scientific) note no. 26)
(Contract AF 61(052)187)
(AFOSR-2914) Unclassified report

DESCRIPTORS: *Transformations (Mathematics), *Series. Complex numbers, Taylor's series, Numbers, Inequalities, Integration.

The value of the best (smallest) finite constant B in the inequality

$$\limsup_{n\to\infty,\, x\to 1,\, n(1-x)\to q} \left| C_n^{(\alpha)} - \sum_{0}^{\infty} a_m x^m \right| \leqslant B \cdot \overline{\lim_{n\to\infty}} \left| a_n^{(\beta)} \right|$$

is obtained for $-1 < \alpha \leqslant \beta \leqslant \alpha + 1$ where $\left\{C_n^{(\alpha)}\right\}$ and $\left\{a_n^{(\beta)}\right\}$ are, respectively, the Cesaro transform of order α, β of, respectively, $\{S_n\}, \{na_n\}$.

AD-277 489 Div. 15
(TISTP/GRW) OTS price $1.60

Hebrew U. (Israel).
ON THE UNITARY PART OF A CONTRACTION,
by S. R. Foguel. May 62, 9p. 5 refs.
(Technical scientific note no. 27)
(Contract AF 61(052)187)
(AFOSR-2915) Unclassified report

DESCRIPTORS: *Functional analysis. Operators (Mathematics).

For every contraction on a Hilbert space a subspace is defined on which the operator was unitary. This analysis is considered to study this subspace and compare it with the spectral decomposition of the operator. (Author)

16. MEDICAL SCIENCES

AD-277 037 Div. 16
(TISTB/MS) OTS price $5.60

Ohio State U. Research Foundation, Columbus.
THE BIOLOGY OF WHOLE BODY MECHANICAL VIBRATION: AN ANNOTATED BIBLIOGRAPHY.
Special rept.,
by George N. Hoover. June 62, 54p. (Rept. no. 862)
(Grants RG-5348 and OH-6)
Unclassified report

DESCRIPTORS: *Vibration - Body, *Bibliography - Vibration. Human engineering, Physiology, Anatomy, Biophysics, Vehicles, Aircraft, Biology, Acceleration tolerance.

The papers are, in general, limited to those dealing with whole body exposures. Many papers have been omitted because of their inavailability at this time. Also, some contributions probably, and most likely, have been overlooked. The papers have been arranged in alphabetical order according to the senior author. In most cases the author's summary or abstract is used. To aid in selecting papers, an author and subject index is appended. The literature search for this work was closed in May 1962. (Author)

AD-277 363 Div. 16
(TISTB/AW) OTS price $5.60

Defense Atomic Support Agency, Washington, D. C.
MODEL FOR PREDICTION OF RETINAL BURNS.
Technical Staff Study,
by John L. Wray. 1 Feb 62, 81p. incl. illus. tables, 23 refs. (Rept. no. DASA-1282)
Unclassified report

DESCRIPTORS: *Burns, *Retina. Nuclear explosions, Analysis, Safety, Thermal radiation, Ophthalmology.

A theory for a method of predicting chorioretinal burns from nuclear weapon explosions is presented. Description of a computer program in FORTRAN II for use on IBM 704, 709, or 7090 is given. The calculation results in spatial and time varying temperature profiles in the energy absorbing layers of the eye tissue. Applying tissue damage criteria to the results will allow analysis of estimates of danger and safe distances for viewing nuclear explosions. (Author)

AD-277 483 Div. 16
(TISTB/AW) OTS price $1.60

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
HUMAN REACTIONS TO AIR IONS PART I, EXPERIMENTAL CONTROLS,
by Allan H. Frey and Richard E. Granda. 1961, 10p. incl. illus. 8 refs.
(Contract Nonr-330300)
Unclassified report

Presented at the International Conference on Ionization of Air, Oct 1961, Philadelphia, Pennsylvania.

DESCRIPTORS: *Ions - Physiology. Respiration, Man, Air, Dosimeters, Instrumentation, Control.

Problems of experimental control in ion work and reliable behavioral measures of ion effects were studied. On the basis of the hypothesis concerning the mechanism of ion effects derived, two behavioral tasks were selected. These were a visual threshold test, explored with a radar simulator, and a psychomotor task which involved a flight vehicle control problem generated by a computer. Temperature, humidity, and aerosols, as well as the ion content, were controlled in a climate control room. (Author)

AD-277 484 Div. 16
(TISTB/AW) OTS price $2.60

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
HUMAN REACTIONS TO AIR IONS. PART II, THE EFFECT OF ATMOSPHERIC IONS ON HUMAN BEHAVIOR,
by Richard E. Granda and Allan H. Frey. 1962, 21p. incl. illus. 22 refs.
(Contract Nonr-330300)
Unclassified report

DESCRIPTORS: *Ions - Physiology. Air, Stress (Physiology), Man, Respiration, Adrenal glands.

The effect of extraneous variables on ions and on ion effects was studied and variables which must be controlled to obtain reliable results in experiments on the effects of air ions, were determined. From a literature survey, it is hypothesized that negative ions stimulate the secretion of glucocorticoids, and positive ions either stimulate the secretion of the mineralo-corticoids or inhibit glucocorticoid secretion. Results obtained with a visual threshold task and psychomotor task support the prediction that under nonstress, ionization has no effect. There were no significant differences between treatments and no consistent pattern within the group of the three treatments means. Under stress, however, the rank order of the treatment means suggests that the ions were affecting the visual and psychomotor behavior. It is commonly reported that a negative ionized condition elicits reports of elation while a positive ionized condition elicits reports of depression. The subjects did not know the purpose of the experiment. Although they volunteered comments of various kinds, they did not make any reports as to the state of their feelings. The only conclusion which might be drawn is that there are indications that ions may have an effect and that stress is a necessary precondition for ion effects to appear. (Author)

17. METALLURGY

AD-277 019 Div. 17
(TISTM/BRW) OTS price $6.60

Manufacturing Labs., Inc., Cambridge, Mass.
THE FLOW TEMPERING OF HIGH-STRENGTH STEELS.
Final technical rept., June 60-Apr 62,
by S. V. Radcliffe, M. Schatz and others. Apr 62, 54p. incl. illus. tables, 15 refs.
(Contract DA 19-020-ORD-5252, Proj. 593-32-004)
(WAL TR 320.4/3-1) Unclassified report

DESCRIPTORS: *Steel - Mechanical properties. Deformation, Heat treatment, Carbon, Austenite, Bainite, Martensite, Phase transitions, Fracture (Mechanics), Aging, Nitrogen, Tensile properties, Hardness, Microstructure, Rocket cases, Tests, Processing, Sheets, Hardening.

Flow-tempering was investigated as a means of attaining high strength and toughness in low-

carbon steels. The effects of flow-tempering on the tensile and fracture toughness properties of three 0.1% carbon steels, two nitrogen steels and a 0.2% carbon steel are presented for a variety of flow-tempering treatments involving the deformation of martensite, tempered martensite and bainite by rolling sheet material up to 85% reduction in thickness. For all the treatments investigated, the yield strength initially rises rapidly with increasing deformation up to some 15% reduction in thickness. With higher deformation, the rate of increase diminishes and becomes approximately linear. The rate of increase in yield strength of the martensitic structures becomes greater with increasing carbon content; thus, a deformation of 60% raises the yield strength of 0.1% C martensite from 145,000 psi to 245,000 psi and that of 0.2% C martensite from 17 ,000 to 300,000 psi. In addition to the strengthening due to strain-hardening, deformation of tempered martensite gives rise to a strength increment due to aging. (Author)

AD-277 060 Div. 17, 14
(TISTM/EJH) OTS price $5.60

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Virginia L. Frazier. May 62, 46p.
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Metals - Bibliography, *Alloys - Reports, *Refractory materials - Indexes, *Scientific reports. Beryllium, Nickel alloys, Steel, Stainless steel, Titanium alloys, Magnesium alloys, Silicon, Niobium alloys, Molybdenum, Tantalum, Vanadium alloys, Tungsten, Tungsten alloys, Graphite, Coatings, Rocket motors, Rocket cases.

AD-277 079 Div. 17
(TISTM/BRW) OTS price $1.60

David Taylor Model Basin, Washington, D. C.
COMPARISON OF STANDARD AND SUBSIZE HY-80 DROP-WEIGHT SPECIMENS FOR VARIOUS CONDITIONS OF HEAT TREATMENT,
by M. L. Salive and A. R. Willner. June 62, 11p. incl. illus. tables, 5 refs. (Rept. no. 1583)
Unclassified report

DESCRIPTORS: *Steel - Heat treatment. Metal plates, Mechanical properties, Fatigue (Mechanics), Propagation, Transition temperature, Impact shock, Test methods, Energy, Temperature, Tests.

This report evaluates the NDT temperatures of subsize and standard drop-weight specimens of HY-80 steel when the crack-starter bead is deposited prior to and after heat treatment. Also included are investigations of the effect of isothermal treatment of the crack-propagation characteristics of the crack-starter bead and the effect of direction of plate rolling on the specimens. (Author)

AD-277 152 Div. 17
(TISTM/EJH) OTS price $6.60

Advanced Metals Research Corp., Somerville, Mass.
RESEARCH TO DETERMINE THE COMPOSITION OF DISPERSED PHASES IN REFRACTORY METAL ALLOYS.
Final rept., 15 Nov 60-30 Nov 61,
by Frank B. Cuff, Jr. Apr 62, 60p. incl. illus. tables, 4 refs.
(Contract AF 33(616)7671, Proj. 7351)
(ASD TDR 62-7) Unclassified report

DESCRIPTORS: *Heat resistant alloys - Microstructure, *Molybdenum alloys - Physical properties, *Niobium alloys, *Phase studies. Lattices, Impurities, Carbides, Solids, Solutions, X-ray diffraction analysis, Electron diffraction analysis, Electron beams, Microphotography, Titanium alloys, Tungsten alloys, Carbon alloys, Vanadium alloys, High temperature research.

The compositions, structures and lattice parameters of the precipitates in two Mo-base and two Nb-base commercial alloys were determined. In general, the precipitates were complex carbides which contained all or nearly all of the alloying constituents in solution. In the case of the Mo-base alloys the compositions could be explained on the basis of both the Mo-Ti-C phase diagram and certain thermodynamic data (free energies of formation). This correlation was not possible for the Nb-base alloys because of the lack of these types of information. In all cases, the experimentally determined structures of the precipitates agreed with the accepted structures. The lattice parameters, on the other hand, deviated from the values for the pure compounds but these deviations could be explained on the basis of one or more alloying elements partially replacing the parent metal in solution. (Author)

AD-277 210 Div. 17, 30
(TISTP/JW) OTS price $7.60

Republic Aviation Corp., Farmingdale, N. Y.
A FEASIBILITY STUDY ON THE DEVELOPMENT OF A PRE-CRACK FATIGUE DAMAGE INDICATOR.
Final rept. on Structural Design Criteria,
by Jerome M. Kossar. Apr 62, 1v. incl. illus. tables, 9 refs. (Rept. no. RAC-620)
(Contract AF 33(616)7103, Proj. 1367)
(ASD TR 61-719)
Unclassified report

DESCRIPTORS: *Fatigue (Mechanics), *Aluminum alloys. Structural shells, Gages, Test equipment, Probability, Detection.

The feasibility of the development of a compact, remote indicating fatigue damage indicator is investigated. The investigation concerns several approaches to the prediction of fatigue failure primarily in 7075-T6 aluminum structure; however, some developed indicators may prove applicable to other structural materials. Test data are included for each of the techniques investigated. One of the gages developed in this program shows excellent promise of fulfilling the requirements of a fatigue damage indicator and is considered feasible for further development.

AD-277 355 Div. 17
(TISTM/TCG) OTS price $1.60

Colorado School of Mines, Golden.
IMPROVED OXIDATION RESISTANCE OF MOLYBDENUM BY ALLOYING WITH RARE EARTH AND OTHER SELECTED METALS.
Interim rept. no. 3, 1 Mar-30 Apr 62.
29 May 62, 11p. incl. illus. table, 5 refs.
(Contract NOw 62-0305-d)
Unclassified report

DESCRIPTORS: *Molybdenum alloys - Chemical properties, *Oxidation, *Rare earth elements. Oxidation inhibitors, Additives, Yttrium, Hafnium, Coatings, Oxides, Hydrogen, Controlled atmospheres, Heat resistant alloys, Metals, Alloys.

Selective oxidation experiments were carried out

at temperatures ranging from 1000 to 1540 C on binary Mo alloys containing 0.026 at-% Yt and 0.056 at-% Hf, respectively, with the object of forming protective coatings of Y2O3 and HfO2. Yt and Hf were selectively oxidized in an H atmosphere. The oxidation rates were parabolic and were achieved by a mechanism of internal oxidation in all experiments performed. This mechanism indicated that the oxygen flux into the alloy exceeded the outward flux of the alloying element to the alloy-air interface. To achieve a protective coating on the alloy surface these rates of flux should be equal. The parabolic rate constants obtained and estimated diffusion coefficients indicated that the outward flux of Yt and of Hf should have been sufficient to achieve a protective outer coating. These results show that higher alloying contents of Yt and Hf, or higher temperatures may well yield the results sought. (Author)

AD-277 403 Div. 17, 26
(TISTM/EJH) OTS price $1.50

Massachusetts Inst. of Tech., Cambridge.
JOINING OF REFRACTORY METALS - TUNGSTEN.
Final rept.,
by J. H. Brophy, H. Heideklang and others.
30 Mar 62, 64p. incl. illus. tables, 34 refs.
(Contract DA 19-020-ORD-5236)
(WAL TR 460.54/1-2)

Unclassified report

DESCRIPTORS: *Tungsten - Bonding, *Refractory materials - Joints, *Metal joints, *Bonded joints. Diffusion, Heat treatment, Spot welding, High pressure research, High temperature research, Electroplating, Palladium, Nickel plating, Metals, Microstructure.

Concepts of activated tungsten diffusion were applied to the joining of tungsten strip at temperatures ranging from 900 to 1100 C. Solid state diffusion was enhanced by electroplating a thin layer of either Ni or Pd on one of the mating surfaces. Assemblies were made by heat treating in a high temperature vise or by spot welding followed by a diffusion treatment. Joints were in sandwich, single-lap, or double-lap geometries. Fractography, metallographic examination, bend tests, and tensile shear loading tests indicated that bonding could be accomplished at temperatures as low as 1000 C. The structure was typically partially recrystallized but free of thermal cracks. The joints were brittle at room temperature, but specimens heated to 2200 C remained capable of bearing a load. A brief theoretical discussion and an interpretation in the light of other joining techniques are offered. (Author)

AD-277 459 Div. 17, 26
(TISTM/EJH) OTS price $8.10

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF A DUCTILE TUNGSTEN SHEET ALLOY.
Summary rept., 26 Apr 61-26 Apr 62,
by J. L. Ratliff, D. J. Maykuth and others.
26 May 62, 80p. incl. illus. tables, 7 refs.
(Contract NOw 61-0677-c)

Unclassified report

DESCRIPTORS: *Tungsten - Mechanical properties, *Tungsten alloys - Mechanical properties, *Heat resistant alloys, *Refractory materials. Powder alloys, Sheets, Production, Powder metallurgy, Solids, Solutions, Melting, Electric arcs, Additives, High temperature research, Transition temperatures, Grains (Metallurgy), Crystallization, Zirconium compounds, Thorium compounds, Dioxides, Rhenium alloys, Oxmium compounds, Iridium alloys.

Separate binary-alloy studies showed that increasing amounts of finely dispersed ThO2 or ZrO2 and critical amounts of Re, Os, and Ir were effective in significantly reducing the ductile-to-brittle bend transition temperature of W as well as in increasing its recrystallization temperature and decreasing its recrystallized grain size. Selected ternary alloys of Re, Os, or Ir with ThO2 were then prepared. The beneficial effects shown by each of these additions on transition temperature and grain size in binary combinations appeared to be additive. Thus, combined additions of 2 to 8 volume per cent ThO2 with 5 per cent Re, 0.87 per cent Os, or 0.30 per cent Ir were effective in lowering the transition temperature of W from 200 C to 75 to 85 C, increasing its recrystallization temperature from 1600 C to 1800 C, and decreasing its recrystallized grain size. (Author)

AD-277 487 Div. 17
(TISTM/BRW) OTS price $2.60

General Dynamics/Fort Worth, Tex.
PROCESSING - CONVENTIONAL CHROMIUM PLATE ON HIGH STRENGTH STEEL - CORROSION RESISTANT FLUID APPLIED TO - EVALUATION OF,
by E. W. Turns. 1 June 62, 20p. incl. illus. table (Rept. no. FGT-2926)
(Contract AF 33(600)38975)

Unclassified report

DESCRIPTORS: *Chromium plating, *Corrosion inhibition. Quality control, Fracture (Mechanics), Detection, Coatings, Effectiveness, Test methods, Lubricants, Bearings, Surfaces, Steel, De-icing materials.

Results are presented of tests designed to (1) determine the degree of improved corrosion protection afforded conventional chromium electroplate by Dow-Corning DC 15A or General Electric's material Number 514-1789-G, (2) develop tests to differentiate between CF-500 and conventional chromium electroplate, and (3) determine the effects of improved corrosion resistant treatments on simulated hinge pin bearing surfaces. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-277 053 Div. 18
(TISTW/EET) OTS price $4.60

Air Force Academy, Colo.
UNCONVENTIONAL WARFARE. PART I. GUERRILLA WARFARE.
May 62, 39p. refs. (Special Bibliography series no. 21)

Unclassified report

DESCRIPTORS: *Guerrilla warfare - Bibliography, *Bibliography - Guerrilla warfare. Warfare, Combat, Army operations, Military operations, Military intelligence, Jungles, Japan, China, Communists, USSR.

A bibliography representing a selected portion of the holdings of the Air Force Academy library on the subject of guerrilla warfare is presented. The list includes books, reports and periodicals covering the following topics: theory, strategy, and tactics; history of guerrilla operations; partisan and resistance operations; underground activities; and tactical training. A glossary of definitions relating to unconventional warfare is included.

AD-277 230 Div. 18
(TISTW/RD) OTS price $13.50

Technical Operations, Inc., Washington, D. C.
OUTPUT IA, A REVISED OUTPUT PROGRAM FOR THE AIR BATTLE MODEL II,
by Barbara R. Petree. Aug 60, 190p. incl. illus. tables (Rept. no. TR 60-1)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Air force operations, Warfare, Tables, Programming, Scheduling, Indexes, Take-off, Refueling in flight, Interception probabilities, Jet fighters, Jet bombers, Aerial targets, Digital computers, Data processing systems.

A complete description of all revisions and modifications made to the ABM II output presentation program is presented. (Author)

AD-277 231 Div. 18
(TISTW/RD) OTS price $1.60

Technical Operations, Inc., Washington, D. C.
OPERATING INSTRUCTIONS (MAGNETIC TAPE SYSTEM). SUPPLEMENT TO ''USERS AND OPERATORS MANUAL.''
Sep 60, 13p. (Rept. no. TR 60-3, suppl. to TR 59-1, vol. 1)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Instruction manuals, Magnetic tape, Digital computers, Handbooks, Coding, Punched card methods, Programming, Data processing systems.

AD-277 232 Div. 18
(TISTW/RD) OTS price $8.60

Technical Operations, Inc., Washington, D. C.
USERS AND OPERATORS MANUAL PLAN CONVERTER IA,
by Carol B. Peters. Dec 60, 97p. (Rept. no. TR 60-4)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Handbooks, Instruction manuals, Air force operations, Warfare, Combat, Scheduling, Programming, Errors, Data processing systems, Digital computers.

A description is given of several modifications to the Plan Converter I program. The revised program will be called Plan Converter IA. Part I contains a description of the modifications. Part II contains the revised operating instructions for the phases of the Plan Converter IA system. Appendix A contains a listing of the various data error comments which are made by the Plan Converter IA program. The revised detail flow charts are included under separate cover as Appendix B. Card formats are contained in ''Card Format Manual, Plan Converter IA,'' TR 60-5, Volumes I and II. (Author)

AD-277 233 Div. 18
(TISTW/RD) OTS price $10.10

Technical Operations, Inc., Washington, D. C.
USERS AND OPERATORS MANUAL. DETAIL FLOW CHARTS PLAN CONVERTER IA. APPENDIX.
Feb 61, 113p. incl. illus. (Rept. no. 60-4, Appendix)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Air force operations, Warfare, Combat, Instruction manuals, Handbooks, Aerial targets, Programming, Scheduling, Data processing systems, Coding.

This appendix contains the detail flow charts for Plan Converter IA and forms an integral part of TR 60-4, Users and Operators Manual, Plan Converter IA, dated December 1960. (Author)

AD-277 234 Div. 18
(TISTW/RD) OTS price $11.00

Technical Operations, Inc., Washington, D. C.
CARD FORMAT MANUAL. VOLUME I. AIR BATTLE MODEL II AND PLAN CONVERTER IA.
Dec 60, 154p. incl. tables (Rept. no. TR 60-5, vol. 1, supersedes rept. no. TR 59-4, vol. 1)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Air force operations, Warfare, Combat, Punched card methods, Aircraft, Guided missiles, Aerial targets, Launching sites, Bombs, Tables, Bombers, Refueling in flight, Air to surface, Countermeasures, Interception probabilities, Handbooks, Instruction manuals.

Contents:
Input table for routine 1
Input tables for routine 2
Input table for routine 3
Input tables for routine 4
Input tables for routine 5
Input table for routine 6
Input tables common to several routines
Input table common to all routines
Initializing tables for ABM II
Input lists for ABM II to be processed and augmented by PC-IA
Input constants for PC-IA (limit values)
Input lists and tables for PC-IA

AD-277 235 Div. 18
(TISTW/RD) OTS price $11.50

Technical Operations, Inc., Washington, D. C.
CARD FORMAT MANUAL. VOLUME II. AIR BATTLE MODEL II AND PLAN CONVERTER IA.
Dec 60, 1v. incl. illus. tables (Rept. no. TR 60-5, vol. 2)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Air force operations, Tables, Atmosphere models, Indexes, Aircraft, Scheduling, Programming, Launching sites, Guided missiles, Refueling in flight, Digital computers, Coding, Data storage systems, Handbooks, Instruction manuals, Punched card methods.

Contents:
Input tables for weather model
Complete description for those tables of the AMB II which contain generated information

Complete description for those tables of the PC-IA which contain generated information
Output tables of the weather model for the ABM II
Input parameters for weather model
Input parameters for PC-IA to be input at game time
Parameters generated by PC-IA for internal use
Input parameters for ABM II to be input at game time
Input parameters for ABM II to be input prior to game time
Parameters generated by ABM II for internal use
Alphabetical index of table names
Appendix: Card forms

AD-277 236 Div. 18
(TISTW/RD) OTS price $8.60

Technical Operations, Inc., Washington, D. C.
USERS AND OPERATORS MANUAL. ATTRITION DAMAGE ASSESSMENT MODEL III,
by Helen Montague. Feb 61, 85p. incl. illus. tables (Rept. no. TR 60-6)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Handbooks, Instruction manuals, Aerial targets, Interception probabilities, Coding, Tables, Programming, Indexes, Jet fighters, Air force operations, Warfare, Combat, Guided missiles, Refueling in flight, Radar stations, Launching sites, Battle damage.

A brief description is presented of the simulation routines, together with a thorough account of inputting and game running procedures. It is assumed that the reader has a basic knowledge of ABM I (Air Battle Model I) of which ADAM (Attrition Damage Assessment Model) is a large part. (Author)

AD-277 237 Div. 18
(TISTW/RD) OTS price $9.60

Technical Operations Inc., Washington, D. C.
USERS AND OPERATORS MANUAL. VOLUME I. AIR BATTLE MODEL II.
June 60, 118p. incl. illus. tables (Technical rept. no. 59-1, vol. 1)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Handbooks, Instruction manuals, Air force operations, Statistical processes, Mathematical prediction, Probability, Programming, Atmosphere models, Digital computers, Data processing systems, Aerial targets, Warfare, Jet fighters, Jet bombers, Guided missiles, Radar stations, Launching sites, Tables, Programming.

This manual is intended to provide the use of ABM II with sufficient information to compile and operate the model and, in the case of difficulty, the ability to interpret the cause of the difficulty. A discussion is presented of the collection of the inputs and the routines required for ABM II. A set of operating instructions are given for both the preparation of an ABM II master game tape and running the model itself. A discussion of the weather model is presented with a great deal of miscellaneous information pertinent to allocation and control. (Author)

AD-277 238 Div. 18
(TISTW/RD) OTS price $9.60

Technical Operations, Inc., Washington, D. C.
USERS AND OPERATORS MANUAL. VOLUME II. PLAN CONVERTER - I,
by Carol B. Peters. May 60, 118p. incl. tables. (Technical rept. no. 59-1, vol. 2)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial research, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Handbooks, Instruction manuals, Air force operations, Warfare, Combat, Scheduling, Programming, Digital computers, Launching sites, Guided missiles, Tables, Aircraft, Interception probabilities, Data processing systems, Surface to surface.

AD-277 239 Div. 18
(TISTW/RD) OTS price $5.60

Technical Operations, Inc., Washington, D. C.
USERS AND OPERATORS MANUAL. VOLUME III. OUTPUT,
by Joyce Friedman and Marvin Lautzenheiser.
Jan 60, 49p. incl. illus. tables (Technical rept. no. 59-1, vol. 3)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Handbooks, Instruction manuals, Air force operations, Digital computers, Data processing systems, Indexes, Launching sites, Surface to surface, Guided missiles, Punched card methods, Coding.

The Air Battle Model Output Presentation Program, ABMOPP is discussed. It sorts, compiles tallies, and presents the output of the Air Battle Model. It was primarily designed for use with ABM II. However, the design is sufficiently general so that the executive control (OPAMOD) can be readily re-used with new tally processes for outputs from other models. Subroutines of the CL-I utility package were used in the SORT, PRESORT, and MODOPA processes. The coding of the tally routines was done in L sub O. In writing the Output System, the goal was to minimize applied man-hours and calendar time, rather than to achieve efficiency or elegance. (Author)

AD-277 240 Div. 18
(TISTW/RD) OTS price $5.60

Technical Operations, Inc., Washington, D. C.
GROSS FLOW CHARTS. VOLUME I. AIR BATTLE MODEL II.
Apr 60, 57p. incl. illus. (Technical rept. no. 59-2, vol. 1)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Programming, Scheduling, Air force operations, Guided missiles, Jet fighters, Jet bombers, Launching sites, Warfare, Combat, Aerial targets, Airplane refueling, Aircraft, Radar stations, Aerial reconnaissance.

AD-277 241 Div. 18
(TISTW/RD) OTS price $2.60

Technical Operations, Inc., Washington, D. C.
GROSS FLOW CHARTS. VOLUME II. PLAN CONVERTER I,

by Carol B. Peters. Feb 60, 17p. incl. illus. (Technical rept. no. 59-2, vol. 2)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Air force operations, Warfare, Scheduling, Programming, Digital computers, Data processing systems, Aerial targets, Launching sites, Guided missiles, Refueling in flight, Airplane refueling, Jet fighters, Jet bombers, Surface to surface.

Contents:
Description of Air Battle Model II
Description of Plan Converter I
Gross flow charts of Plan Converter I
Gross flow charts of Plan Converter I routines

AD-277 242 Div. 18
(TISTW/RD) OTS price $11.00

Technical Operations, Inc., Washington, D. C.
DETAIL FLOW CHARTS. VOLUME I. AIR BATTLE MODEL II.
Mar 60, 145p. incl. illus. (Technical rept. no. 59-3, vol. 1)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Programming, Scheduling, Launching sites, Airplane refueling, Air force operations, Guided missiles, Aerial targets, Warfare, Landing fields, Radar stations.

AD-277 243 Div. 18
(TISTW/RD) OTS price $9.60

Technical Operations, Inc., Washington, D. C.
DETAIL FLOW CHARTS. VOLUME II. PLAN CONVERTER-I.
Jan 60, 105p. incl. illus. (Technical rept. no. 59-3, vol. 2)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Programming, Scheduling, Air force operations, Warfare, Digital computers, Data processing systems.

AD-277 244 Div. 18
(TISTW/RD) OTS price $5.60

Technical Operations, Inc., Washington, D. C.
DETAIL AND GROSS FLOW CHARTS. VOLUME III. OUTPUT,
by Marvin Lautzenheiser and Joyce Friedman.
Feb 60, 47p. incl. illus. (Technical rept. no. 59-3, vol. 3)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Programming, Scheduling, Air force operations, Warfare, Digital computers, Data processing systems.

AD-277 246 Div. 18
(TISTW/RD) OTS price $11.50

Technical Operations, Inc., Washington, D. C.
CARD FORMAT MANUAL. VOLUME II. AIR BATTLE MODEL II AND PLAN CONVERTER I.
Jan 60, 1v. incl. tables (Technical rept. no. 59-4, vol. 2)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Atmosphere models, Tables, Indexes, Meteorological radar, Punched card methods, Air force operations, Warfare, Digital computers, Data processing systems.

AD-277 247 Div. 18
(TISTW/RD) OTS price $9.10

Technical Operations, Inc., Washington, D. C.
A GUIDE TO THE AIR BATTLE MODEL II, CARD FORMAT MANUAL. VOLUME III. OUTPUT.
Nov 59, 1v. incl. tables (Technical rept. no. 59-4, vol. 3)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Simulation - Aerial warfare, *Aerial warfare - Simulation. Instruction manuals, Handbooks, Tables, Punched card methods, Air force operations, Warfare, Digital computers, Data processing systems.

This volume is intended to serve as a card format guide for the collection and orderly presentation, on punched cards, of the output data and plans required by the ABM-II. Format for cards other than output are found in volumes I and II of this report. (Author)

AD-277 248 Div. 18
(TISTW/RD) OTS price $11.50

Technical Operations, Inc., Washington, D. C.
THE AIR BATTLE MODEL II GLOSSARY,
comp. by M. Perriens, L. Rowe, and P. Stickler.
Feb 60, 149p. incl. illus. tables (Technical rept. no. 59-5)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Operations research - Aerial warfare, *Games theory - Aerial warfare, *Aerial warfare - Simulation, *Simulation - Aerial warfare. Coding, Dictionaries, Air force operations, Warfare, Digital computers, Data processing systems.

AD-277 254 Div. 18
(TISTW/EET) OTS price $8.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
PROJECT TE/AS THREAT EVALUATION AND ACTION SELECTION TECHNIQUES FOR LIMITED WAR ENVIRONMENTS. LIMITED WAR ENVIRONMENTAL STUDY 1970-1980,
by Hale Mason and Edwin W. Roth. Sep 61, 74p. incl. tables, 26 refs. (Rept. no. ZF-1447-G-5)
(Contract AF 19(604)7361)
Unclassified report

DESCRIPTORS: *Warfare. Operations research, War potential, Military operations, Military intelligence, Air force operations, USSR, Nuclear warfare, Space weapons, Guided

missiles, Satellite vehicles, Surface to air, Hypervelocity vehicles, Guerrilla warfare, Fighter bombers, Bombers, Nuclear propulsion.

The objective of the limited war environmental study is to assist in providing a basic understanding of limited warfare and to assist in the derivation and evaluation of the threat evaluation and action selection (TE/AS) concepts. The investigation is concerned primarily with the types of military forces, USAF operations and the expected scope of limited wars which the United States may become involved in during the 1970-1980 era. (Author)

19. NAVIGATION

AD-277 064 Div. 19, 32
(TISTE/CDM) OTS price $16.00

Coast Guard, Washington, D. C.
PROCEEDINGS OF THE SIXTH INTERNATIONAL TECHNICAL CONFERENCE ON LIGHTHOUSES AND OTHER AIDS TO NAVIGATION, SEPTEMBER 25-OCTOBER 7, 1960.
1960, 245p. incl. illus.
Unclassified report

DESCRIPTORS: *Conferences - Lighthouses, *Lighthouses, *Navigational lights, *Symposia - Navigational lights. Indexes, Light homing, Lighting equipment, Navigation, Coast Guard, Signal lights, Fog signals, Power supplies, Electronic equipment, Auditory signals, Ships.

AD-277 447 Div. 19, 1
(TISTW/EET) OTS price $1.60

Aeronautical Instruments Lab., Naval Air Development Center, Johnsville, Pa.
EVALUATION OF VERTICAL GYROSCOPES FOR USE WITH THE AN/APN-122 NAVIGATION SETS,
by C. Dean Hendrickson. 2 Jan 62, 7p. illus.
(Rept. no. NADC-AI-6201)
Unclassified report

DESCRIPTORS: *Gyroscopes, *Radar navigation. Airborne, Doppler radar, Doppler navigation, Navigation, Naval aircraft, Antisubmarine warfare, Acceleration, Test equipment, Flight testing, Errors, Reliability.

A simple vertical reference capable of high accuracy, in a limited speed range, and during continuous turning maneuvers was required. Four instruments were tested, using the light reflection method. Two of these were special modifications for this purpose. Of these, it is concluded that the T4101 type gyro, as modified for AIL by the substitution of two single axis electrolytic sensors for previous vertical sensor, was the best instrument for this and similar applications. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-277 008 Div. 20, 17
(TISTP/WH) OTS price $1.60

General Electric Co., Schenectady, N. Y.
RESEARCH DIRECTED TOWARD THE STUDY OF THE RADIATION DAMAGE THRESHOLDS OF THE ELEMENTS.
Final rept., Mar 59-Mar 62,
by R. M. Walker. June 62, 9p. incl. illus.
(Contract AF 19(604)5557, Proj. 5620)
(AFCRL-62-316) Unclassified report

DESCRIPTORS: *Radiation damage, *Metals. Electrons, Electron microscopes, Aluminum, Silver, Copper, Iron, Molybdenum, Nickel, Titanium, Zinc, Gold, Tungsten.

Most of the work consisted of measurements and analysis of electron induced radiation damage in the following metals: Al, Ag, Au, Cu, Fe, Mo, Ni, Ti, W, and Zn. The results of this work have previously been described in a series of six scientific reports, and the main features of these reports are reviewed here. In addition, some suggested future directions are presented. Recent work on the electron microscope observation of radiation damage is also discussed briefly. (Author)

AD-277 115 Div. 20
(TISTP/WH) OTS price $8.10

Technical Operations, Inc., Burlington, Mass.
MONTE CARLO CALCULATIONS ON THE REFLECTION AND TRANSMISSION OF SCATTERED GAMMA RADIATIONS.
Final rept. (Rev.),
by Dominic J. Raso. May 62, 1v. incl. illus. tables, 6 refs. (Rept. no. TO-B61-39, supersedes AD-262 362)
(Contract NBy-32190)
Unclassified report

DESCRIPTORS: *Gamma rays, *Numerical methods and procedures, *Scattering. Transmission, Photons, Digital computers, Tables, Dose rate, Concrete.

Monte Carlo calculations were performed to determine the backscattering and the transmission of gamma rays having energies between 0.02 Mev and 10.0 Mev from concrete. The radiation was assumed to be incident on a semi-infinite medium and on various slab thicknesses of 0.5, 1.0, 2.0, and 4.0 mfp at angles of cos theta sub zero = 1.0, 0.75, 0.50, 0.25, and 0.10. The case histories of 5000 photons were followed on the IBM 704 digital computer. The information obtained included: (1) the characteristics of emergent photons, which were stored on magnetic tape; (2) a routine that processes these characteristics to give polar and azimuthal angular dose distribution; and (3) detailed results from the application of the processing routine to the parameters investigated. The computer program, the processing routine, and the results are appended. (Author)

AD-277 282 Div. 20
(TISTP/WH) OTS price $2.60

Florida State U., Tallahassee.
MULTI-LEVEL AND MULTI-CHANNEL ANALYSIS OF ELASTIC SCATTERING,
by G. E. Mitchell. May 62, 19p. 14 refs.
(Technical rept. no. 4)
(Contract AF 49(638)427)
(AFOSR-2871) Unclassified report

DESCRIPTORS: *Elastic scattering. Analysis, Matrix algebra.

Division 21 - NUCLEAR PROPULSION
Division 22 - ORDNANCE

AD-277 387 Div. 20
(TISTP/WH) OTS price $4.60

Illinois U., Urbana.
MESON PRODUCTION IN THE INTERACTIONS OF 26.7 Gev/c PROTONS WITH EMULSION NUCLEI,
by Y. K. Lim. 1961, 46p. incl. table.
(Contract Nonr-183405)
Unclassified report

DESCRIPTORS: *Mesons, *Proton reactions. Photographic emulsions, Scattering, Targets, Meson scattering, Nucleons.

A sample of 133 interactions in nuclear emulsions initiated by 26.7 Gev/c protons was examined. It was found possible to separate the events fairly well into two groups, one in which almost all of the shower particles were emitted in a single nucleon-nucleon collision in a target nucleus, the other (cerca 20%) in which the shower particles were produced in two or more successive collisions in a target nucleus. Analysis of the effective target mass distribution of the events and the (log cot theta) distribution, where theta is the laboratory emission angle of a shower particle, supported the above interpretation and indicated that an appreciable fraction of the events in the first group might be attributed to peripheral nucleon-nucleon collisions. (Author)

21. NUCLEAR PROPULSION

AD-277 461 Div. 21, 20, 2
(TISTA/VGW) OTS price $13.50

General Dynamics/Fort Worth, Tex.
TORY-IIA EFFLUENT SAMPLING PROGRAM.
Final rept.
22 June 62, 196p. incl. illus. tables, 11 refs.
(Document no. NARF-61-45R; FZK-9-177)
(Contract AF 33(600)38946)
Unclassified report

DESCRIPTORS: *Test reactors - Fission products, *Test reactors - Exhaust systems. Radioactive wastes, Atmosphere, Diffusion, Tracer studies, Jet engines, Exhaust gases, Aerosols, Instrumentation, Test facilities, Radio hazards, Meteorology.

A release of trace quantities of fission products had been postulated as a consequence of the operation of the high-temperature air-cooled TORY-IIA engineering test reactor. To determine the effluents released, and environmental dispersal of these effluents, the Air Force Special Weapons Center (AFSWC) - assisted by General Dynamics/Fort Worth - constructed an air-sampling and micrometeorological network at the AEC Nevada Test Site. The network instrumentation provided the data needed to evaluate the radiological hazards associated with the downwind dispersal of fission products. The direct radiation from the reactor was also measured. The experimental data and their analysis are presented along with a description of the test site, sampling equipment, and analytical techniques used. (Author)

22. ORDNANCE

AD-277 297 Div. 22
(TISTW/EET) OTS price $3.60

Army Arctic Test Board, Fort Greely, Alaska.
CONFIRMATORY TEST OF MACHINE GUN, CALIBER .50, FIXED, M85.
3 June 62, 32p. incl. illus. tables, 14 refs.
(Proj. no. ATB 2-92)
Unclassified report

DESCRIPTORS: *Automatic weapons. Tanks, Armored vehicles, Cupolas, Feed mechanisms, Gun mounts, Ejection, Arctic regions, Effectiveness, Reliability, Test methods, Tests.

The M85 machine gun weighs 63 lbs. and is 55 in. long, 6 in. high, and 5 in. wide. It incorporates a high and a low rate of fire and can be fired electrically or manually. The low rate of fire is achieved by means of a time delay mechanism which causes a delay in the start of the counter-recoil stroke of the bolt assembly. The ammunition feed direction can be changed by repositioning component parts. Throughout testing, the weapon was stored outdoors and exposed to ambient temperatures ranging from 40 F to -66 F. Cold-soak periods ranged from 8 hours to 50 days. Ambient temperatures during firing ranged from 30 F to -56 F. Throughout all tests, tank crewmen were dressed in arctic winter clothing. The test machine gun was satisfactory with respect to weapons and ammunition functioning, accuracy, barrel life, comfort, compatibility with related equipment, maintenance and durability and reliability. It was concluded that the 50 cal. M85 machine gun is suitable for army use under arctic winter conditions.

AD-277 381 Div. 22,
(TISTW/DLW) OTS price $1.60

General Electric Co., Burlington, Vt.
PROJECT VULCAN RESEARCH AND DEVELOPMENT.
Progress rept. no. 33, 1 Feb-31 Mar 62,
by R. H. Barrett. 30 Apr 62, 12p. incl. illus.
(Rept. no. R61APB769-33)
(Contract DA 19-020-ORD-5455)
Unclassified report

DESCRIPTORS: *Aircraft guns, *Automatic weapons - Airborne. Cams, Bolts, Boresighting, Design, Tests.

Contents:
Improved part life
  Cycloidal cam configuration
  MIL-L-46000 with 20% Teflon #5
Boresighting and target study
Gun components
  Bolt roller shafts
Range records

AD-277 413 Div. 22, 8
(TISTW/EET) OTS price $2.60

Naval Weapons Station, Yorktown, Va.
HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE.
THE DEVELOPMENT OF TECHNIQUES TO DETECT AND DETERMINE THE EFFECTS OF HEAT ON SELECTED PRIMARY EXPLOSIVES.
Progress rept. no. 1,
by Ernest E. Mason and Dorothy H. Zehmer.
22 Jan 62, 22p. incl. illus. (R&D rept. no. 81)
Unclassified report

DESCRIPTORS: *Explosives, *Electromagnetic waves - Hazards. Dextrins, Azides, Lead compounds, Bromides, Potassium compounds, Azo radicals, Nitro radicals, Phenols, Decomposition, Thermochemistry, Chemical reactions, Sensitization, Heat, Detonation, Stability, Infrared spectroscopy, Microscopy, Infrared spectrophotometers, Infrared radiation, Measurement, Hazards, Naval ordnance, Ordnance.

The work reported is concerned with determining the effects of heat on selected primary explosives at elevated temperatures. Preliminary efforts in the program include the analyses of diazodinitrophenol (DDNP) and lead azide by differential thermal analysis, infrared spectroscopy and microscopy. Details of these analyses are reported along with accompanying thermograms and spectra. (Author)

AD-277 434 Div. 22, 8
(TISTW/EET) OTS price $8.10

Naval Weapons Station, Yorktown, Va.
THE DEVELOPMENT OF TECHNIQUES TO DETECT AND DETERMINE THE EFFECTS OF HEAT ON SELECTED PRIMARY EXPLOSIVES.
Progress rept. no. 2, 1 Jan-31 Mar 62, by Ernest E. Mason and Dorothy H. Zehmer. 20 Apr 62, 37p. illus. (R&D rept. no. 82)
Unclassified report

DESCRIPTORS: *Explosives, *Electromagnetic waves - Hazards. Azo radicals, Nitro radicals, Dextrins, Lead compounds, Azides, Polymers, Vinyl alcohol, Thiocyanates, Infrared spectroscopy, Heat, Chromatographic analysis, Gas flow, Detonation, Bridges, Wire, Infrared spectrophotometers, Thermal conductivity, Infrared radiation, Measurement, Ordnance, Naval ordnance, Thermochemistry.

The effects of vacuum, pressure and dynamic gas flow at various heating rates in differential thermal analysis are presented in composite thermograms for diazodinitrophenol, dextrinated lead azide, polyvinylalcohol lead azide, pure lead azide, dextrine and polyvinylalcohol. The work in infrared spectroscopy includes a calibration curve for determining the weight of diazodinitrophenol as a function of its -N=N- group. The method involves the use of potassium thiocyanate as an internal standard. A method for determining the nitrogen content of milligram quantities of dextrinated lead azide by gas chromatography is also presented. (Author)

AD-277 458 Div. 22
(TISTW/JRG) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN APPLICATION OF THE JET-FORMATION THEORY TO A 105MM SHAPED CHARGE,
by F. E. Allison and R. Vitali. Mar 62, 28p. incl. illus. tables, 7 refs. (BRL rept. no. 1165)
(Proj. 503-04-002)
Unclassified report

DESCRIPTORS: *Shaped charges - Mathematical analysis, *Cavity liners. Silver, Radioactive isotopes, Tracer studies, Penetration, Steel, Metal plates, Targets, Jets, Velocity, Theory.

The equations describing the cone-collapse and jet-formation process are shown to be in excellent agreement with the emerging-jet-velocity, radioactive-tracer, and slug-recovery data for the 105mm unconfined test charge. Because the number of parameters measured experimentally exceeds the number needed to solve the equations, compatibility of the data with the equations shows that the nonsteady theory correctly describes the formation of that portion of the jet able to penetrate mild steel. A polynomial representation of the collapse velocity is obtained which is believed sufficiently accurate for most problems requiring values for this parameter. (Author)

23. PERSONNEL AND TRAINING

AD-277 188 Div. 23
(TISTB/AW) OTS price $4.60

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
LEARNING TO IDENTIFY NONVERBAL SOUNDS: AN APPLICATION OF A COMPUTER AS A TEACHING MACHINE,
by John A. Swets. 23 Apr 62, 55p. incl. illus. (Contract N61339-789)
(NAVTRADEVCEN-789-1) Unclassified report

DESCRIPTORS: *Teaching machines. Effectiveness, Military training, Auditory signals, Identification.

The procedures of automated instruction -- continual interrogation and overt response, immediate knowledge of results, presentation of successive items conditional upon previous performance, learner-controlled pacing of the lesson, and so forth -- were applied to the task of learning to identify multidimensional, nonverbal sounds. These procedures produced results that are comparable to those obtained previously with conventional training methods. Certain of the central features of automated instruction were found to hinder learning in the task studied. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-277 229 Div. 24
(TISTA/VGW) OTS price $1.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION K-47 CAMERA/LA-124 MAGAZINE.
June 62, 8p. (Rept. no. TAC-TR-61-74)
Unclassified report

DESCRIPTORS: *Aerial cameras - Aerial reconnaissance, *Photographic equipment - Photographic film. Flight testing, Effectiveness, Operation.

Good over-all results were obtained consistently with an interval of 0.7 sec. Although good day photography was taken at 0.6 and 0.5 sec intervals, there were runs where one camera would have unscorable pictures throughout the run. Other runs would have only one or two blurred photos. At 0.7 sec and slower intervals, the blurring was less frequent and usually only one exposure at the time. After the initial pulse relay was eliminated the two or three blurred and overlapped exposures at the beginning of each run were eliminated. At 0.6 sec and faster intervals, the first exposure of each run was blurred. Since the limited number of cycles to be expected of the LA-124A magazine are acceptable, it is recommended that kits be procured to modify all K-47 installations in TAC's RB-66A aircraft. (Author)

25. PHYSICS

AD-277 002 Div. 25, 7
(TISTM/TCG) OTS price $4.60

Electro-Optical Systems, Inc., Pasadena, Calif.
HIGH TEMPERATURE SEMICONDUCTING COMPOUNDS FOR THERMOELECTRIC POWER GENERATION.
Final comprehensive rept., 15 Dec 60-15 Dec 61, by C. B. Jordan. 15 Jan 62, 39p. incl. illus. table, 4 refs. (EOS rept. no. 1592-Final)
(Contract NObs-84327)
Unclassified report

DESCRIPTORS: *Semiconductors - Electrical conductance, *Electric power production - Materials, *Thermoelectricity. Uranium compounds, Thorium compounds, Sulfides, Selenides, Tellurides, Thermal conductivity, Synthesis, Chemical analysis, Resistance, Phase studies, High temperature research, High pressure research, Test equipment.

Certain sulfides, selenides, and tellurides of uranium and thorium were investigated with respect to their potential usefulness as high-temperature thermoelectric materials. Intermediate phases with compositions of the forms MX, MX2, and M2X3 (where M = Th or U, and X = S, Se, or Te) were synthesized, and their Seebeck coefficients and electrical resistivities measured as functions of temperature. The only material found to have a Seebeck coefficient sufficiently high to be of particular interest was ThS2, with a value of 700 microV/degrees C at 400 C. Determination of the chemical and crystalline composition of the synthesized materials was a difficult problem, and it was recommended that any continuation of the work be concentrated on overcoming this difficulty. (Author)

AD-277 006 Div. 25
(TISTP/GRW) OTS price $2.60

Hebrew U. (Israel).
SPONTANEOUS EMISSION OF PHONONS AND SPECTRAL LINE WIDTHS OF SOME RARE EARTH IONS IN CRYSTALS,
by S. Yatsiv. Jan 62, 18p. incl. illus. tables, 10 refs. (Technical note no. 1)
(Contract AF 61(052)549)
(AFCRL 62-627) Unclassified report

DESCRIPTORS: *Rare earths, *Ions, *Thermionic emission. Transition temperature, Phonons, Crystals, Relaxation time, Excitation, Spectrographic analysis.

A correlation is found between the line widths in the spectra of rare-earth ions in crystals and relaxation processes between closely spaced Stark levels. It is inferred from work on relaxation times between magnetic sublevels that the transition probabilities between neighboring Stark levels are often as high as 10 to the 10th power arc sec. The resulting reduction in the lifetime of such levels is sufficient to broaden optical transitions. Upon continuous excitation at low temperatures, a population inversion is maintained in a large number of energy intervals of these ions. (Author)

AD-277 007 Div. 25, 4
(TISTP/GRW) OTS price $1.60

Hebrew U. (Israel).
ABSORPTION SPECTRUM OF YTTERBIUM IN SINGLE CRYSTAL OF CALCIUM FLUORIDE,
by W. Low. Feb 62, 17p. incl. illus. tables, 15 refs. (Technical note no. 2)
(Contract AF 61(052)549; In cooperation with National Research Council of Canada, Div. of Pure Physics)
(AFCRL 62-628) Unclassified report

DESCRIPTORS: *Rare earths, *Ytterbium, *Spectrographic analysis, Absorption, Single crystals, Calcium compounds, Fluorides, Temperature.

High resolution spectrum of Yb(3+) in the cubic field of CaF2 is reported. The striking features of the spectrum are two strong sharp lines at 10384.759/cm and 10377.039/cm at 4.2 K. The position of the two lines and their separation was measured as a function of the temperature. The line shape is Lorentzian. The possible position of the various Stark levels of the ground state is discussed. (Author)

AD-277 012 Div. 25, 4, 8
(TISTM/TCG) OTS price $3.60

Radiation Lab., Johns Hopkins U., Baltimore, Md.
DIELECTRIC BEHAVIOR OF LEAD NITRATE AND THALLIUM NITRATE AT A WAVELENGTH OF ONE CENTIMETER,
by J. J. Whalen. June 62, 26p. incl. illus. tables, 9 refs. (Technical rept. no. WR-AF-3)
(Contract AF 33(616)6457)
Unclassified report

DESCRIPTORS: *Lead compounds, *Thallium compounds, *Nitrates. Dielectric properties, Absorption, Electromagnetic waves, Energy, Theory, Test methods, Mathematical analysis.

The absorption of Pb(NO3)2 and TlNO3 in the frequency band 28-36 Gc was investigated. Instead of measuring the absorption directly, the dispersion of the real part of the complex dielectric constant is measured by slotted line methods. A graphical method of data analysis was developed for determining the dielectric constant of a low-loss, nonmagnetic material over a broad band of frequencies. This method of analysis is applied to the nitrate data. Values of dielectric constant versus frequency are plotted. The dielectric constant Pb(NO3)2 varied from 14.7 ± 0.1 to 14.4 ± 0.1 over the frequency band 28 to 36 Gc; the dielectric constant of TlNO3 was 13.5 ± 0.1 over the frequency band 27 to 37 Gc. Since dispersion is not exhibited by the real part of the dielectric constant, it was concluded that Pb-nitrate and Tl nitrate do not exhibit absorption in the frequency band 28 to 36 Gc. (Author)

AD-277 073 Div. 25
(TISTP/WH) OTS price $1.10

Electrical Engineering Research Lab., U. of Illinois, Urbana.
TABLES OF THE TRANSVERSE MAGNETIC COEFFICIENTS K(Y) AND L(Y),
by Peter V. Gray. 30 Apr 62, 7p. incl. tables, 2 refs. (Technical note no. 6)
(Contract AF 49(638)417, Proj. 9763)
(AFOSR-2665) Unclassified report

DESCRIPTORS: *Magnetic fields, *Semiconductors, *Hall effect. Magnetic effects, Electrical properties.

Identifiers: Magnetoresistance.

Tables of K(gamma) and L(gamma) as defined by Willardson, Harman, and Beer (Phys. Rev. 96:1512, 1954) are given over the range in which simple (high and low field) approximations

are not valid. The tables permit easy multi-band calculation of the transverse magneto-resistance and isothermal Hall coefficient in non-degenerate semiconductors in the lattice scattering range. (Author)

AD-277 074 Div. 25
(TISTP/WH) OTS price $2.60

Illinois Inst. of Tech., Chicago.
PLASTIC ANALYSIS OF CYLINDRICAL SHELLS UNDER PRESSURE, AXIAL LOAD, AND TORQUE,
by Philip G. Hodge, Jr. and Joseph Panarelli.
Apr 62, 19p. illus. (DOMIIT rept. no. 1-17)
(Contract Nonr-140604, Proj. NR 164-429)
Unclassified report

DESCRIPTORS: *Structural shells, *Load distribution, *Plasticity. Cylindrical bodies, Torque, Loading, Stresses.

An explicit parametric form of the yield condition is obtained for an arbitrary thin shell whose material yields according to the Mises yield criterion. The general results are particularized to the case of a cylindrical shell. As an example, close bounds are found for the yield-point loading surface of a cantilever shell subjected to a radial pressure, an axial force, and a twisting moment. (Author)

AD-277 075 Div. 25
(TISTW/EET) OTS price $2.60

Illinois Inst. of Tech., Chicago.
CRUSHING OF A TUBE BETWEEN RIGID PLATES,
by John A. DeRuntz, Jr. and Philip G. Hodge, Jr.
May 62, 19p. illus. 10 refs. (DOMIIT rept. no. 1-18)
(Contract Nonr-140604, Proj. NR 064-429)
Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Structural shells, *Applied mechanics. Metal plates, Steel, Stresses, Shear stresses, Load distribution, Mechanical properties, Plasticity, Elasticity, Hardening, Mathematical analysis, Theory, Deformation, Deflection, Experimental data, Analysis, Moments.

The load-deformation curve is obtained for a thin tube crushed between two parallel, rigid plates. It is found that the influence of geometry changes after initial yield results in increased load carrying capacity. In addition, the effects on the yield condition due to direct stress and shear are quantitatively discussed. (Author)

AD-277 076 Div. 25, 15
(TISTP/JW) OTS price $3.60

Illinois Inst. of Tech., Chicago.
SINGULAR CASES IN THE OPTIMUM DESIGN OF FRAMES,
by George J. Megarefs and Philip G. Hodge, Jr.
May 62, 28p. incl. illus. 19 refs. (DOMIIT rept. no. 1-19)
(Contract Nonr-140604, Proj. NR 064-429)
Unclassified report

DESCRIPTORS: *Load distribution, *Beams, *Structures. Design, Costs, Airframes, Analysis, Elasticity.

Many previous studies in optimum design have determined the parameters so as to set equal to zero the first variation of the property to be optimized. It is shown that in some simple cases the minimum value may not be a point of zero variation and that points of zero variation may be relative maxima as well as minima. A general theoretical explanation of such behavior is given and applications are made to simple frames. (Author)

AD-277 077 Div. 25
(TISTP/JW) OTS price $2.60

Illinois Inst. of Tech., Chicago.
A PRACTICAL METHOD FOR PLASTIC DESIGN OF FRAMES,
by George J. Megarefs and Philip G. Hodge, Jr.
May 62, 23p. incl. illus. 9 refs. (DOMIIT rept. no. 1-20)
(Contract Nonr-140604, Proj. NR 064-429)
Unclassified report

DESCRIPTORS: *Airframes, *Load distribution. Analysis, Design, Plasticity, Elasticity.

The inadequacies of the idealized expressions of the optimizing criterion used so far in the problem of minimum weight design of beam-and frame-structures, and the absurdities to which they lead, are pointed out. The introduction of an approximate expression for the optimizing criterion is proposed, which greatly simplifies the problem by transforming it to one of linear elastic analysis; the reasonableness of the method is then illustrated on a simple example. Finally the possibility of improving the accuracy of the method and of widening its application to more general types of structures is discussed. (Author)

AD-277 078 Div. 25
(TISTP/JW) OTS price $2.60

Illinois Inst. of Tech., Chicago.
INTERACTION OF PRESSURE, END LOAD, AND TWISTING MOMENT FOR A CIRCULAR TUBE,
by Joseph E. Panarelli and Philip G. Hodge, Jr.
June 62, 19p. incl. illus. 18 refs. (DOMIIT rept. no. 1-21)
(Contract Nonr-140604, Proj. NR 064-429)
Unclassified report

DESCRIPTORS: *Load distribution. Elastic shells, Cylindrical bodies, Plastic flow, Elasticity, Stresses, Torque, Pressure.

A thick-walled circular cylinder acted on by pressure, axial end load, and twisting moment is analysed under the assumption that end effects are negligible. The locus of all load points (interaction surface) for which unaccelerated flow of a perfectly plastic material can occur is found parametrically. Certain special cases are considered and the results compared with those of shell theory. (Author)

AD-277 109 Div. 25, 7
(TISTM/TCG) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
THERMOELECTRIC MATERIALS.
Summary rept., 19 Oct 58-31 May 61,
by J. W. Johnson. 1 July 61, 13p. incl. illus. refs.
(Contract NObs-77017)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Materials - Electrical properties, *Semiconductors - Liquids. Phthalocyanines, Copper compounds, Sulfides, Additives, Silver compounds, Indium compounds, Tellurides, Chemical properties, Physical properties, Resistance, Thermal conductivity

Resistance measurements of pressed pellets of metal-free phthalocyanine ranged from 2 x 10 to the 11th power at room temperature to 8 x 10 to the 6th power ohm-cm at 225 C. An activation energy of 1.385 ev was calculated for conduction; the Seebeck coefficient was -1680 micro v/C at 220 C. Liquid semiconductors having thermoelectric properties comparable with Cu2S were

produced by addition to Cu2S. The best material investigated to date contained 75% Cu2Te-25% Cu2S. The improvement in the thermoelectric properties of Cu2S for power generation apparently depends more on lowering the resistivity than by raising the Seebeck coefficient. The Cu-S ratio should be altered by increasing the S content rather than the Cu content. Ag-In tellurides prepared by heating equivalent amounts of the elements in an evacuated sealed quartz tube did not produce stoichiometric compositions.

AD-277 122 Div. 25
(TISTM/EJH) OTS price $14.50

Westinghouse Electric Corp., Pittsburgh, Pa.
THERMOELECTRICITY.
Quarterly progress rept. no. 4, 11 Sep-11 Nov 61. 11 Nov 61, 217p. incl. illus. tables, refs.
(Contract NObs-84317)
Unclassified report

DESCRIPTORS: *Semiconductors - Materials, *Intermetallic compounds, *Thermoelectricity, *Rare earth compounds. Antimony compounds, Antimonides, Selenides, Tellurides, Manganese compounds, Thallium compounds, Bismuth compounds, Cerium compounds, Sulfides, Gold compounds, Lanthanum compounds, Hydrides, Lead compounds, Indium compounds, Germanium compounds, Arsenides, Copper compounds, Electrical properties, Thermal conductivity, Hall effect, Manufacturing methods, Solid state physics, Liquids.

Eight papers having a direct bearing on the thermoelectric project are included. These are: The Role of Se Vapor Pressure in the Formation of Ag Doped MnSe: The effects of doping on the vapor pressure of a thermoelectric material were investigated toward the solution of practical problems of thermocouple encapsulation. Preparations and Properties of Some Rare Earth Semiconductors and Certain Mixed Hydride-Chalcogenide Rare Earth Compounds: In these papers, detailed directions are given for the preparation of the optimumly doped thermoelectric material CeS1.38 and for many other rare earth compounds which were investigated as possible thermoelectric elements. Solid Solution Studies of Some Post-Transition Metal Tellurides of the Rock-Salt Structural Type and Electrical Properties of-T1SbTe2-T1BiTe2 Solid Solutions: These papers summarize a part of the study on cubic compounds. A Technique for Pulling Single Crystals of Volatile Materials, A Rotating Sample Method for Measuring the Hall Mobility, and A Steady-State Comparative Apparatus for Measuring Thermal Conductivity Between 100 C and 800 C. (Author)

AD-277 124 Div. 25
(TISTP/GRW) OTS price $21.00

CONESCO, Arlington, Mass.
SURVEY AND EVALUATION OF SONIC FATIGUE TESTING FACILITIES.
Rept. for 1 Feb 60-Jan 61 on Dynamic Problems in Flight Vehicles,
by Ralph A. Bianchi, Ronald T. Brannaw and others. Mar 62, 364p. incl. illus. tables, refs.
(Contract AF 33(616)7003, Proj. 1370)
(ASD TR 61-185) Unclassified report

DESCRIPTORS: *Acoustics, *Fatigue (Mechanics). Test facilities, Noise.

An evaluation of the sonic fatigue testing facilities throughout the country was made to establish present methods and techniques of testing and to determine the necessity of performing other environmental tests in combination with high intensity noise. A few of the general conclusions are that: The most economical procedure for developing sonic fatigue resistant structures consists of the general steps: (a) Design panels with discrete frequency siren methods, (b) Perform semi-qualification tests with broad band sources such as broad band sirens or modulated air flow speakers (not jet engines), and (c) Perform a full scale proof test. The effects of temperature and pressure (and perhaps corrosion) can only be assessed by combined tests. Combined tests for nuclear radiation should not be considered in the foreseeable future. In many instances the effects of correlation can be approximated in a discrete frequency siren test by orienting a specimen in a manner determined by consideration of the sound level contours existing on the aircraft. (Author)

AD-277 130 Div. 25, 10
(TISTM/EJH) OTS price $3.60

Aeronutronic, Newport Beach, Calif.
AN EXPERIMENTAL PROGRAM FOR OBTAINING THE THERMODYNAMIC PROPERTIES OF PROPELLANT COMBUSTION PRODUCTS.
Quarterly technical summary rept. no. 4,
by D. L. Hildenbrand, L. P. Theard and others.
15 June 62, 36p. incl. illus. tables, 17 refs.
(Publication no. U-1734)
(Contract NOw 61-0905-c)
Unclassified report

DESCRIPTORS: *Solid rocket propellants - Thermodynamics, *Thermochemistry, *Combustion chamber gases. Vaporization, Sublimation, Vapor pressure, Vapors, Gas ionization, Mass spectroscopy, Dissociation, Heat of formation, Heat of sublimation, Specific heat, Aluminum compounds, Beryllium compounds, Lithium compounds, Fluorides, Borates, Chlorides, Hydrogen compounds, Zirconium compounds, Oxygen compounds, Chemical reactions, Reaction kinetics, Boron compounds.

Contents:
Effusion studies
Vaporization of LiBO2
Vaporization of LiF - BeF2 and AlF3 - BeF2 mixtures
Vaporization of B4C
Transpiration studies
ZrO2OHCl reaction
Mass spectrometry
Vapor species in the B-O-F system
Summary of thermodynamic data

AD-277 138 Div. 25
(TISTP/WH) OTS price $4.60

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
THE TRANSMISSION OF VIBRATION BY TOWED CABLES,
by Richard H. Lyon. 28 May 62, 36p. incl illus. 8 refs. (Rept. no. 934)
(Contract Nonr-346800, Proj. NR 383-424)
Unclassified report

DESCRIPTORS: *Towing cables, *Vibration. Water, Oscillation, Hydrodynamics, Vortices, Damping.

Cables of the order of a few centimeters in diameter, moving in water, and having an average density of 1 to 8 gm/cc are considered. The speed of motion will be taken in the range of 50-500 cm/sec. For a kinematic viscosity of 1/100 sq cm/sec, appropriate for water, the diameter Reynolds number R is in the range 10,000 to 100,000. Vortex shedding may be expected to be the principal source of vibration transmission. (Author)

AD-277 154 Div. 25
(TISTP/WH) OTS price $1.10

Boeing Scientific Research Labs., Seattle, Wash.
PROPOSAL OF A NEW METHOD FOR THE PRECISION MEASUREMENT OF FRACTIONAL BIREFRINGENCE IN PHOTOELASTICITY,
by Y. F. Cheng. Apr 62, 7p. illus. 3 refs.
(Rept. no. D1-82-0165)
Unclassified report

Also available from author.

DESCRIPTORS: *Photoelasticity. Refraction, Optics.

For most work in transmitted light photoelasticity, the Tardy and Senarmont methods (Brit. J. Appl. Phys. 4:138-141, 1953) have superseded the compensator method of measuring the fractional birefringence, since they require no apparatus other than a standard polariscope, are more convenient in operation, and generally are capable of greater accuracy. The scattered light technique provides a non-destructive method in three-dimensional stress analysis and a foundation for three-dimensional photoplasticity. However, in this technique, the scattering property of the model material acts as an analyzer and the Tardy and Senarmont methods cannot be used. The only means heretofore available for the measurement of fractional birefringence with scattered light has been the compensator method. In this investigation, a new method is proposed for its precision measurement without employing the compensator. The results show that this technique is also applicable to transmitted light photoelasticity. (Author)

AD-277 155 Div. 25
(TISTP/WH) OTS price $21.00

Douglas Aircraft Co., Inc., Santa Monica, Calif.
A SYNOPTIC COMPILATION OF THIN FILM TECHNOLOGY INCLUDING ION AND ELECTRON PHYSICS AND ULTRAHIGH VACUUM TECHNOLOGY,
by C. S. Hellmann. May 62, 365p. (Rept. no. SM-41729)
Unclassified report

DESCRIPTORS: *Thin films, *Bibliography. Solid state physics, Deposits, Interferometers, Laboratory equipment, Secondary emission, Vacuum systems.

Comments are presented on a compilation of documents pertaining to various aspects of the field of thin films. The listings are divided into two main categories: books (including reports, papers, and catalogs) and articles. The entries are listed in reverse chronological order and are grouped into 25 subject headings. An author list and appendix are also furnished. (Author)

AD-277 166 Div. 25
(TISTP/WH) OTS price $4.60

Harvard U., Cambridge, Mass.
LABORATORY STUDIES OF ATOMIC AND ELECTRONIC COLLISION PROCESSES RELEVANT TO THE STUDY OF THE UPPER ATMOSPHERE.
Final rept.,
by N. P. Carleton. 25 Apr 62, 50p. incl. illus. 21 refs.
(Contract AF 19(604)4984; Continuation of Contract AF 19(628)318)
(AFCRL 62-475) Unclassified report

DESCRIPTORS: *Upper atmosphere, *Ionosphere, *Sky brightness. Ions, Electrons, Molecules, Scattering, Aurorae, Light.

Atomic and electronic collision processes related to the study of the upper atmosphere are treated. There is particular emphasis on processes producing visible radiation. The problems studied are in three groups: (1) investigation of excitation by electron, ion, and atom impact; (2) study of reactions which ions and molecules in excited states may undergo; and (3) field study of fluctuations in auroral light. (Author)

AD-277 174 Div. 25, 17
(TISTM/JSM) OTS price $6.60

Manufacturing Labs., Inc., Cambridge, Mass.
THE LATTICE STABILITY OF METALS - III, IRON,
by Larry Kaufman, E. V. Clougherty, and R. J. Weiss. 15 June 62, 60p. incl. illus. tables, 58 refs. (Technical rept. no. 5)
(Contract Nonr-260000, Proj. NR 031-627)
Unclassified report

DESCRIPTORS: *Iron, *Lattices, *Crystals - Crystal structure. Iron alloys, Ruthenium, Ferroelectric crystals, Thermodynamics, Specific heat, Enthalpy, Temperature, Pressure, Stability, Spin, Resistance, Metals, Alloys.

Measurements of the electrical resistance of iron over the temperature range 325 to 1425 K at pressures up to 95 kilobars have been performed to determine the temperature of the reversible transition b.c.c. and f.c.c. and estimate the resistivity of b.c.c. and f.c.c. iron as a function of pressure. The results were combined with relevant thermodynamic, volumetric, and physical property data to evaluate the dominant factors controlling the relative stability of f.c.c. and b.c.c. iron as a function of temperature and pressure. It is suggested that the unusual electronic properties of f.c.c. iron stem from the existence of two spin states and the variation in the occupancy of these states with temperature and pressure. (Author)

AD-277 180 Div. 25, 8, 26
(TISTE/CAM) OTS price $2.60

Knights, James, Co., Sandwich, Ill.
PRECISION GLASS CRYSTAL UNITS.
Quarterly rept. no 3, 1 Nov 61-31 Mar 62,
by Louis A. Dick and R. D. Cortright. 31 Mar 62, 21p. incl. illus.
(Contract DA 36-039-sc-87268, Proj. 3G-26-05-001)
Unclassified report

DESCRIPTORS: *Glass, *Crystals - Design. Vacuum pumps, High vacuum valves, Ions, Gas ionization, Molecules, Atoms, Magnetic fields, Cathodes (Electron tubes), Titanium, Resistance, Measurement, Medium frequency, High frequency.

Research was continued to develop a series of precision glass crystal units designed to operate on the fundamental mode, in the frequency range of 1 to 5 mc per second. The vacuum system being used, a fluidless type, is described, together with fixturing used to plate directly to frequency, and to seal the HC-27/U holders. A design for 3 mc has yielded a Q of 1 x 10 to the 6th power. Details are given. At 1 mc, shaping the crystal units by cutting the sides, to get to 0.555 inches on one diameter, resulted in a substantial increase in resistance, hence achieving the specified Q is more doubtful. (Author)

AD-277 190 Div. 25
(TISTP/TL) OTS price $2.50

Owens-Illinois Technical Center, Toledo, Ohio.
RESEARCH IN HIGH-TEMPERATURE X-RAY DIFFRACTION TECHNOLOGY.

Final rept., 1 July 60-15 Sep 61 on Surfaces and Interface Phenomena of Matter,
by S. M. Lang and E. W. Franklin. Mar 62, 105p. incl. illus. tables, refs.
(Contract AF 33(616)7470, Proj. 7022)
(ARL 62-315) Unclassified report

DESCRIPTORS: *High temperature research, *X-ray diffraction analysis, *Goniometers, *Spectrophotometers, *Thorium compounds, *Dioxides, *Quartz, *Platinum compounds. Design, Feasibility studies, Water, Cooling, Thermocouples, Transparent panels, Atmosphere, Measurement, Power, Control systems, Vacuum systems, X-ray diffraction cameras, Simulation, Materials, Absorption.

A successful study resulted in the assembly of an inductively-heated high-temperature x-ray diffractometer furnace that operates with an unmodified Norelco high-angle goniometer spectrometer. The design criteria, the various feasibility trials, and the general features of the instrument are discussed. (Author)

AD-277 193 Div. 25, 7
(TISTP/WH) OTS price $8.60

Jet Propulsion Center, Purdue U., Lafayette, Ind.
INVESTIGATION OF A D.C. ARC STABILIZED IN A CYLINDRICAL TUBE,
by J. G. Skifstad. Apr 62, 96p. incl. illus. 97 refs. (Rept. no. I-62-5)
(Contract Nonr-110017)
Unclassified report

DESCRIPTORS: *Electric arcs, *Plasma physics. Direct current, Gas flow, Stability, Cylindrical bodies, Pipes.

Arc-jet research is being conducted to obtain information for improving understanding of the complex phenomena in plasma jet devices that employ gas-stabilized arc configurations. Research concerns specifically: the process of heating a gas by an arc discharge; the flow conditions immediately downstream from the arc-heating region, as affected by the operating conditions; the local heat transfer rates to the walls confining the arc discharge; the flow process in a nozzle, as influenced by the flow conditions leaving the arc-heating region; and the local heat transfer rates to the walls of the nozzles. (Author)

AD-277 202 Div. 25
(TISTP/WH) OTS price $2.75

Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville.
INVESTIGATION OF MAGNETIC AND ELECTRIC FORCES FOR ROTATING SHAFT SUSPENSION.
Final rept., Mar 61-Feb 62,
by D. F. Nieman, F. E. Moss and others. May 62, 131p. incl. illus. tables (Rept. no. EMI-4441-117-62U)
(Contract AF 33(616)7864, Proj. 3145)
(ASD TDR 62-441) Unclassified report

DESCRIPTORS: *Bearings, *Magnetic fields, *Electrostatic fields. Feasibility studies, Shafts, Magnets, Servo systems, Servomechanisms, Journal bearings, Electromagnets, Electric fields.

The initial efforts in the study of magnetic and electric journal bearings are described. These include: (1) the selection of magnetic systems rather than electric or superconducting systems for the first study; (2) the selection of a magnetic system which uses static magnetic fields for the radial confinement; (3) construction details; (4) static test results; and (5) servo system design. Statically, the system has given a radial restoring force coefficient of 0.5 pounds per milli-inch, and simultaneously, an axial unbalance force coefficient of 5.4 pounds per milli-inch. A servo system is proposed for the axial confinement. Theoretical designs are given for several types of compensation techniques to achieve stability. It is shown that the mass of the supported member and the axial stiffness required demand an electromagnet that can respond with large forces to frequencies as high as 1200 cps. Measurements on the actual components of the system point to the difficulty in achieving such a response.

AD-277 218 Div. 25
(TISTP/TL) OTS price $8.60

St. Louis U., Mo.
THEORETICAL STUDIES CONNECTED WITH THE SOLID STATE RASER.
Final technical rept.,
by W. A. Barker, Mohan Lal Narchal and others. 14 Apr 62, 60p. incl. illus. tables, 23 refs.
(Contract AF 49(638)612)
(AFOSR 2558) Unclassified report

DESCRIPTORS: *Solid state physics - Theory, *Single crystals, *Microwave amplifiers, *Quantum mechanics. Nuclear spins, Noise, Polarization, Lattices, Relaxation time, Solids, Thermodynamics, Quantum statistics, Masers, Low frequency.

This theoretical analysis demonstrates that low noise radio frequency amplifiers may be designed and constructed. These devices, which we call RASERS, are radio frequency masers. Inversion of the nuclear spin population distribution may be achieved by saturating an allowed or forbidden electron spin transition with microwave power of the appropriate frequency. The redistribution of nuclear spin population takes place as a result of a number of factors among which are: (1) the relative magnitude of the nuclear Zeeman interaction and the hyperfine interaction, (2) the algebraic sign of the nuclear gyromagnetic ratio or the hyperfine coupling contrast, (3) the orientation and frequency of the ''pumping'' field or fields, and (4) the nature and relative magnitude of the relaxation mechanisms. Eight cases of negative enhancement are tabulated on the nuclear polarization chart. Other possibilities are discussed in this analysis in more complex cases. (Author)

AD-277 219 Div. 25
(TISTM/EJH) OTS price $8.60

South Dakota School of Mines and Technology, Rapid City.
MEASUREMENT OF SOME THERMAL AND ELECTRICAL PROPERTIES OF BISMUTH TELLURIDE AND INDIUM ANTIMONIDE IN A MAGNETIC FIELD.
Master's thesis,
by Fred Hornstra Jr. and Robert G. Morris. 1 July 62, 87p. incl. illus. 42 refs. (Technical rept. no. 5)
(Contract Nonr-296401, Proj. NR 017-208)
Unclassified report

DESCRIPTORS: *Semiconductors - Magnetic fields, *Bismuth compounds, *Tellurides, *Indium compounds, *Antimonides. Intermetallic compounds, Crystals, Single crystals, Thermal conductivity, Conductivity, Electrical conductance, Laboratory equipment.

An apparatus was constructed for the measurement of thermal conductivity in a vacuum in a magnetic

field by the series comparison method. The thermal conductivity and the Seebeck coefficient of polycrystalline Bi_2Te_3 were measured at 460 K, and the thermal conductivity, electrical resistivity, and the Seebeck coefficient of single-crystal InSb were measured at 529 K in four magnetic fields ranging from zero to a maximum of 8000 gauss. The relative change (the change in value divided by the zero-field value) of thermal conductivity for Bi_2Te_3 was less than 2% in the field of 8000 gauss. A maximum relative change of -11% was observed for InSb was observed. A maximum change of electrical resistivity in a magnetic field of 8000 gauss for InSb was 32 per cent. A maximum increase in the thermoelectric figure of merit for InSb was 15 percent in a magnetic field of 8000 gauss. (Author)

AD-277 266 Div. 25
(TISTM/EJH) OTS price $1.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
NEW METHOD FOR MEASURING SURFACE ENERGIES AND TORQUES OF SOLID SURFACES,
by P. G. Shewnon. 1962, 15p. illus. 10 refs.
(Contract Nonr-76019, Proj. NR 031-676)
Unclassified report

DESCRIPTORS: *Surfaces, *Surface properties, *Solid state physics. Solids, Wetting agents, Metals, Graphite, Sapphires, Copper, Silver, High temperature research, Thermodynamics, Theory, Energy, Measurement.

A novel technique for determining the surface energy and its derivative with respect to orientation is described. Essentially it involves the floating of a wedge on the substrate, said wedge being made of a material which is not wet by the substrate, i.e., as a greased needle floats on water. A thermodynamic analysis of a system in which the wedge is supported entirely by surface energy is given. If the original surface is not at a cusp orientation, the surface tension is directly measurable from the groove angle formed. If the original surface is at a cusp orientation, there may or may not be a groove depending on the relative values of the derivative with respect to orientation and the weight of the wedge. Experiments primarily on Cu and Ag showed that sapphire, quartz and refractory metal wedges were wet while graphite wedges were not. The technique was demonstrated to work using graphite wedges, but the results obtained were not as accurate as those obtained by other workers using the wire-creep experiments. (Author)

AD-277 352 Div. 25
(TISTP/WH) OTS price $9.60

Northwestern U., Evanston, Ill.
A SPECTROSCOPIC TECHNIQUE FOR THE MEASUREMENT OF TEMPERATURE IN TRANSPARENT PLASMAS,
by Carl F. Knopp, Chad F. Gottschlich and Ali Bulent Cambel. July 61, 106p. incl. illus. tables, 21 refs.
(Contract AF 49(638)879)
(AFOSR-1100) Unclassified report

DESCRIPTORS: *Plasma physics, *Spectrographic analysis. Temperature, Electric arcs, Argon.

A spectroscopic technique developed by Fowler and Milne (Monthly Not. R.A.S. 83:403, 1923; 84:499, 1924) has been employed to evaluate the temperature in a plasma produced by an electric arc. Design of the experimental apparatus used in this study is discussed and representative results obtained with the apparatus are given. In the course of the investigation, the theoretical particle densities as well as the partition function of an argon plasma have been calculated. (Author)

AD-277 358 Div. 25
(TISTP/JW) OTS price $1.10

Radio Observatory, Calif. Inst. of Tech., Pasadena.
OBSERVATIONS OF THE CALIFORNIA INSTITUTE OF TECHNOLOGY RADIO OBSERVATORY, OWENS VALLEY, CALIFORNIA 1962. 3. TESTS FOR LINEAR POLARIZATION IN THE 1390 MC/S RADIATION FROM SIX INTENSE RADIO SOURCES,
by D. Morris and V. Radhakrishnan. 1962, 5p. illus. table, 13 refs.
(Contract Nonr-22019)
Unclassified report

DESCRIPTORS: *Synchrotrons, *Polarization, *Radio waves. Electron diffraction analysis, Electromagnetic fields, Linear systems, Radiation effects.

AD-277 364 Div. 25
(TISTA/WAW) OTS price $4.60

David Taylor Model Basin, Washington, D. C.
ELASTIC STRESSES IN RING FRAMES OF IMPERFECTLY CIRCULAR CYLINDRICAL SHELLS UNDER EXTERNAL PRESSURE LOADING,
by Kenneth Hom. May 62, 37p. incl. illus. 16 refs. (Rept. no. 1505)
Unclassified report

DESCRIPTORS: *Elastic shells - Stresses, *Cylindrical bodies - Stresses, *Elasticity - Mathematical analysis. Failure (Mechanics), Flanges, Rings, Deformation, Integral equations, Partial differential equations.

A solution is obtained for elastic stresses in the ring frames of an imperfectly circular cylindrical shell of finite length subjected to external pressure. The method of analysis follows closely that used by Kendrick (Naval Construction Research Estab. Reports R.211, R.243, R.244 (1953)) in which an initial out-of-roundness shape is assumed and the principle of minimum potential energy is used to derive expressions for critical stress. However, an initial out-of-roundness in which the radial deviation is a cosine function is used in this analysis, whereas Kendrick assumed that the out-of-roundness was similar in form to the general-instability mode. The function used for the radial deviation in this report implies that there is no sagging of the cylinder generators between bulkheads, a condition more representative of actuality. This solution leads to flange stresses which are higher than those obtained from the theory of Kendrick. An approximate solution is also derived from which flange stresses can easily be computed once the elastic general-instability pressures and associated buckling modes of the perfect cylinder are known. This simplified result leads to maximum bending stresses in the frame flange which are $4/\pi$ times greater than those found from a corresponding simple formula derived by Kendrick from his more complete solution. (Author)

AD-277 373 Div. 25, 8
(TISTP/JW) OTS price $11.50

Electronics Research Lab., U. of Calif., Berkeley.
PLASMA CONFINEMENT OF ELECTROMAGNETIC WAVES,
by G. August. 24 Aug 61, 145p. incl. illus. tables, 21 refs. (Scientific rept. no. 16; Series no. 60, Issue no. 398)
(Contract AF 19(604)2270, Proj. 5634)
(AFCRL-62-63)
Unclassified report

DESCRIPTORS: *Plasma physics, *Waveguides. Magnetic fields, Particles, Waveguides, Velocity, Microwaves, Electromagnetic waves.

The wave propagation, wave confinement, and rf power loss characteristics of certain plasma waveguides are studied theoretically. Plasmaguides having a cross section consisting of a circular vacuum region surrounded by plasma are studied in finite, zero, and infinite dc axial magnetic fields. A formal solution is obtained for the finite field case. Quantitative solutions are obtained for certain of the other cases. Plasmaguide propagation characteristics normally closely resemble those of metal circular waveguide. The plasmaguide skin depth is about the velocity of light divided by the radian plasma frequency. When multiple Coulomb collisions of the plasma particles are the dominant rf power loss mechanism, the plasmaguide has a Q exceeding that of a metal circular waveguide for plasma electron energies in excess of several ev, for typical microwave operating conditions. (Author)

AD-277 377 Div. 25
(TISTP/GRW) OTS price $1.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
THE OPTICAL STROBE,
by E. T. Pearson. May 62, 11p. incl. illus.
(Rept. no. R-1632)
(Proj. 505-01-003)
Unclassified report

DESCRIPTORS: *Prisms (Optics), *Stroboscopes. Optical images, Rotation.

The pechan prism is used to obtain a continuous stationary image of a rotating object, i.e., the rotating object appears to be motionless. Auxiliary optical equipment may be used to increase or decrease the field of vision, simultaneously view five sides of a rotating cube, view objects off the axis of the prism, etc. Because the image is continuous, there is some advantage to be realized when compared to light stroboscopes. (Author)

AD-277 378 Div. 25
(TISTP/FR) OTS price $19.50

General Electric Co., Schenectady, N. Y.
RESEARCH AND DEVELOPMENT ON CORONA-RESISTANT MATERIALS.
Rept. for 15 June 60-15 Oct 61, on Electronic and Magnetic Materials,
by J. C. Devins, H. L. Greenhaus and others.
Mar 62, 127p. incl. illus. tables, refs.
(Contract AF 33(616)7485, Proj. 7371)
(ASD TR 61-693) Unclassified report

DESCRIPTORS: *Electric discharges, *Insulating materials, *Electric insulation. Ions, Plastics, Varnishes, Fluorocarbons, Glass.

The shapes of individual corona pulses and the changes in the shape with the applied voltage were determined. It was found that as the overvoltage increased the pulses change from a type characteristic of corona avalanches to one characteristic of streamer discharge. The change was interpreted theoretically by consideration of the positive ion space charge produced in the early stages of the discharge. The chemical reactions were studied in detail on polyethylene. On other insulation materials the gross reactions have been studied with an eye to a broad general method of testing. (Author)

AD-277 380 Div. 25
(TISTP/WH) OTS price $5.60

General Electric Co., Schenectady, N. Y.
RESEARCH ON SPONTANEOUS MAGNETIZATION IN SOLID BODIES.
Final rept., 1 June 60-31 Oct 61 on Electronic and Magnetic Materials,
by I. S. Jacobs, D. S. Rodbell, and W. L. Roth.
Feb 62, 45p. incl. illus. tables, refs.
(Contract AF 33(616)7396, Proj. 7371)
(ASD TR 61-630) Unclassified report

DESCRIPTORS: *Magnetism, *Magnetic materials. Nuclear magnetic resonance, Microstructures, Solids, Ferromagnetism, Antiferromagnetism.

The nuclear magnetic resonance of Co-59 in metallic cobalt powders was examined. In addition to the absorption characteristic of Co-59 in face-centered cubic cobalt, there was found an additional group of absorptions, one of which is clearly associated with hexagonal close packed cobalt. The phenomenon of spin-flopping in antiferromagnetic MnF2, in which the axis of antiferromagnetism is decoupled from the crystal axes, was observed by magnetization measurements in high pulsed magnetic fields. Its position coincided with the value, 93 kOe, predicted from measurements of antiferromagnetic resonance with millimeter microwaves. The temperature dependence of the magnetocrystalline anisotropy of face-centered cubic cobalt metal was examined by ferromagnetic resonance on single crystal thin films and submicron precipitate particles in Cu, at temperatures below the range in which this is the stable structure. Satisfactory agreement is obtained for a tenth power law between anisotropy and magnetization. An investigation of magnetic exchange and structure in lanthanum manganite perovskite compounds spanning the transition between antiferromagnetism and ferromagnetism was performed using neutrons diffraction and high field magnetization techniques. (Author)

AD-277 384 Div. 25
(TISTP/FR) OTS price $1.60

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
STUDY OF ADSORPTION OF GASES ON SOLIDS IN THE HIGH VACUUM RANGE.
Scientific rept. no. 1, 1 Jan-31 Mar 62,
by C. M. Bliven. 30 Apr 62, 11p. incl. illus.
1 ref. (Rept. no. TR 62-255.1)
(Contract AF 19(628)331)
(AFCRL 62-372) Unclassified report

DESCRIPTORS: *Gases, *Adsorption, *Vacuum systems. Pressure, Measurement, Adsorption indicators.

An ultra-high vacuum system is described which was designed to perform surface adsorption studies in the region of extremely low pressures. Provision has been made for the controllable, contamination-free admission of gases into the system, and for the measurement of the composition and amount of gas present with an omegatron mass spectrometer. (Author)

AD-277 385 Div. 25, 15
(TISTP/JW) OTS price $10.50

Israel Inst. of Tech., Haifa.
COLLECTIVE MODES IN A PLASMA DUE TO TRANSVERSE INTERACTION.
Final technical rept.,
by G. Kalman. 31 Dec 61, 136p. incl. illus.
31 refs.
(Contract AF 61(052)393)
(ARL-251) Unclassified report

DESCRIPTORS: *Plasma oscillations, *Magnetic fields, *Plasma physics. Particles, Density, Magnetohydrodynamics, Cyclotrons, Diffusion, Fourier analysis.

The collective motion of a plasma due to the static magnetic interaction between the particles was studied with the aid of the Random Phase Approximation. A close analogy with plasma oscillations is demonstrated. An equation of motion is established. The motion may assume oscillatory or unstable character, depending on the unisotropy of the velocity-distribution. No collective motion is excited in thermal equilibrium. Then the effect of a more sophisticated model where both external magnetic field and the coupling of the two component species are taken into account, is considered. The stabilizing effect of the magnetic field, and new modes, such as magnetohydrodynamic waves, cyclotron waves, a peculiar two-component instability, are derived. Next, a general dispersion-relation is considered. The motion is decomposed into individual and collective contributions and self-consistency requirement establishes the dispersion-relation. For large wave numbers the oscillatory motion suffers a Landau-damping, while in the case of increasing modes there is a maximum wave number that limits the spectrum of instabilities. Finally a beams treatment supplements the analysis. (Author)

AD-277 386 Div. 25, 15
(TISTP/JW) OTS price $3.60

Israel Inst. of Tech., Haifa.
RESEARCH ON THE MICRO-STRUCTURE OF THE MAGNETIC FIELD IN A PLASMA. PART I. ON THE STATISTICAL DISTRIBUTION OF STOCHASTIC FIELDS.
Final technical rept.,
by P. Teitelbaum and G. Kalman. 15 Dec 61, 34p. 8 refs.
(Contract AF 61(052)177)
(ARL-250) Unclassified report

DESCRIPTORS: *Plasma physics, *Electrostatic fields, *Magnetic fields. Distribution theory, Density, Particles, Polynomials, Statistical distributions, Special functions, Microstructure.

Questions connected with the statistics of field quantities are considered. The model is a system of uncorrelated random sources: the field quantities being linear and instantaneous functions of the source coordinates. General properties of the C function, non-uniform particle density, the evaluation of the C function for binary field correlations are studied. Polynomial expansion in terms of the Fourier-component of the non-uniformity and the distance and inverse distance between the correlation points are given. (Author)

AD-277 392 Div. 25, 1, 12, 31
(TISTP/WH) OTS price $3.00

Armed Services Technical Information Agency, Arlington, Va.
SHOCK AND VIBRATION ENVIRONMENT. AN ASTIA REPORT BIBLIOGRAPHY,
comp. by Wendell L. Hercules. 15 Aug 62, 1v. 1000 refs.
Unclassified report

DESCRIPTORS: *Impact shock, *Vibration, *Space environmental conditions, *Bibliography.

This bibliography was prepared by ASTIA in response to requests for information concerning shock and vibration environment. Citations are included for unclassified reports cataloged by ASTIA from 1953 to 1 July 1962. Entries are arranged alphabetically by subject area. In general, the references fall within the following broad topic areas: mechanical shock and vibration; application to particular fields such as space technology, naval engineering, military equipment, test facilities; and associated environments. Of special interest under associated environments is the subject area Space Environmental Conditions. A classified volume of the bibliography is issued separately as AD-329 865.

AD-277 393 Div. 25
(TISTP/TL) OTS price $8.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 8. SOLID STATE RESEARCH. NO. 1, 1962.
11 June 62, 91p. incl. illus. tables, 5 refs.
(Contract AF 19(604)7400)
(AFESD TDR 62-96) Unclassified report

DESCRIPTORS: *Solid state physics, *Semiconductors, *Plasma physics - Stability, *Electromagnets - Design, *Superconductors, *Spectrographic analysis, *High pressure research, *Magnetic materials. Microwaves, Switches, Optics, Infrared radiation, Ruby, Lasers, Diodes, Transistors, Solids, Perturbation theory, Magnetic fields, Impurities, Metals, Alloys, Tin, Gallium alloys, Arsenic compounds, Surface properties, Praseodymium compounds, Oxides, Electronic equipment, Single crystals, Magnetic susceptibility, Tin alloy.

Contents:
Solid state device design
Chemistry
Materials research
Band structure of solids
Microwave and magnetic properties of solids
Transition-metal compounds
Magnetic films
Electronic components
Optics and infrared

AD-277 400 Div. 25,
(TISTP/WH) OTS price $13.50

Microwave Lab., Stanford U., Calif.
HARMONIC GENERATION IN FERRITES,
by P. M. Richards. Feb 62, 185p. incl. illus. 54 refs. (Scientific rept. no. 37; ML rept. no. 875)
(Contracts AF 19(604)1930 and DA 36-039-sc-85263)
(AFCRL 62-76)
Unclassified report

DESCRIPTORS: *Ferrites, *Nuclear magnetic moments, *Nuclear spins. Garnet, Vector analysis, Harmonic analysis.

A theoretical and experimental study was undertaken of harmonic generation in ferrites with emphasis on the second harmonic variation of the z-component of magnetization. The normal mode formulation, based on the Holstein-Primakoff transformation, was extended to a treatment of harmonic generation from arbitrary distributions of magnetization. Experiments were performed at a fundamental frequency of 9320 mc on polycrystalline yttrium iron garnet (YIG) samples of varying composition and gave good quantitative agreement with theory for harmonic generation in the linearized region, for which the susceptibility is independent of power levels. An extensive calculation was made of the effects of spin waves excited in a conventional ferrimagnetic resonance (Suhl instability) upon harmonic generation. Spin wave excitation in the presence of crystalline anisotropy was considered. It is shown that if the sample is magnetized along an intermediate anisotropy direction, such as the (110) for cubic symmetry, the z-directed spin waves are elliptically polarized and can contribute directly to the second harmonic component. (Author)

Division 25 - PHYSICS

AD-277 407 Div. 25
(TISTP/JW) OTS price $3.60

Microwave Lab., Stanford U., Calif.
A VARIATIONAL TECHNIQUE FOR DETERMINING THE PROPAGATING MODES OF A FINITE PLASMA,
by S. S. Jha and G. S. Kino. Mar 62, 16p. incl. illus. 5 refs. (Scientific rept. no. 40; ML rept. no. 897)
(Contract AF 19(604)1930)
(AFCRL 62-176)
Unclassified report

DESCRIPTORS: *Plasma physics, *Differential equations, *Wave transmission. Wave characteristics, Density, Waveform generators, Propagation, Polynomials, Microwaves.

The use of a variational method to determine the propagating characteristics of a slow wave mode along a finite plasma column of nonuniform density is described. Rayleigh-Ritz procedures are used to determine the best approximation for the rf field variation over the cross section. For this purpose, a set of Jacobi orthogonal polynomials is constructed which are orthogonal over the cross section of the plasma. Both the dc density variation of a plasma and the rf field variations within the plasma are expressed in terms of this set of polynomials. This procedure yields results in good agreement with an exact field theory in the range ba is less than 2 where b is the propagation constant. The propagating characteristics depend on the average value of the density within the column. (Author)

AD-277 411 Div. 25
(TISTP/WH) OTS price $.75

Naval Research Lab., Washington, D. C.
A NUMERICAL PROCEDURE FOR SHOCK AND FOURIER ANALYSIS,
by G. J. O'Hara. 5 June 62, 26p. incl. illus. tables, 12 refs. (NRL rept. no. 5772)
Unclassified report

DESCRIPTORS: *Structures, *Shock, *Numerical methods and procedures. Elasticity, Fourier analysis, Integration.

A numerical integration technique for use in structural dynamics is described. The method is capable of computing damped and undamped shock spectra, Fourier sine, cosine, and regular Fourier integrals (frequency response from transient response), and the inversion of the Fourier sine and cosine integrals (transient response from frequency response). It can also be used to calculate Fourier series coefficients, and for the numerical solution of nonlinear equations. Several examples are worked out in detail and some others calculated by NAREC (NRL's digital computer) are shown to present some idea of the precision of the method. (Author)

AD-277 416 Div. 25
(TISTM/EJH) OTS price $15.50

Oklahoma State U. Research Foundation, Stillwater.
INVESTIGATION OF SEMICONDUCTING PROPERTIES OF TYPE IIb DIAMONDS.
Final rept.,
by W. J. Leivo, M. D. Bell and others. May 62, 224p. incl. illus. tables, 321 refs.
(Contract AF 18(603)40)
(AFOSR-2642) Unclassified report

DESCRIPTORS: *Solid state physics - Conductivity, *Semiconductors - Optics, *Diamonds. Photoconductivity, Hall effect, Electrical properties, Luminescence, Fluorescence, Half life, Electrons, Spin, Cyclotrons, Resonance.

Contents:
Optical transmission studies
Rectification at metal-diamond interface
Photovoltaic effect
Photoconductivity
Hall effect studies
Lifetimes of carriers
Luminescence studies
Electron spin resonance
Design and construction of a magnet for high field studies of diamond
Cyclotron resonance

AD-277 436 Div. 25
(TISTP/WH) OTS price $12.00

Arizona U., Tucson.
THE INFLUENCE OF MECHANICAL SHIELDING ON THE RESPONSE OF A BURIED CYLINDER,
by D. A. DaDeppo and J. F. Werner. Feb 62, 154p. incl. illus. tables, 16 refs.
(Contract NBy-32199)
Unclassified report

DESCRIPTORS: *Underground structures, *Soils, *Nuclear explosions, *Stresses. Cylindrical bodies, Shock waves, Damping.

A theory for calculating the response of a shock isolated-buried cylinder to blast loads was presented. The theory is based on several assumptions. The two most important assumptions introduced are: (1) the soil can be represented as a linear elastic medium, and (2) strains throughout the physical system are small. The theory was applied to a particular structure in both isolated and unisolated configurations. The results of the analytical response studies indicate that: shock isolation enhances the ability of a buried cylinder to resist blast loads; thrust is the most important quantity to be considered insofar as structural damage is concerned; and thrusts are reduced as a result of yielding of the isolating material. (Author)

AD-277 443 Div. 25
(TISTP/TL) OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
SOME GAS DYNAMIC CHARACTERISTICS OF ARGON PLASMA - APPLICATION TO JET SPREADING,
by K. E. Tempelmeyer and J. B. Dicks. July 62, 45p. incl. illus. table, 17 refs. (AEDC TDR 62-88)
(Contract AF 40(600)1000)
Unclassified report

DESCRIPTORS: *Plasma physics, *Argon - Thermal conductivity, *Plasma jets - Thermodynamics, *Nozzles, *Gases - Dynamics. Gas flow, Heating, Electromagnetic fields, Low temperature research, Magnetohydrodynamics, Pressure, Energy, Wind tunnels, Tests, Schlieren photography, Air.

Jet spreading characteristics of a low-temperature argon plasma expanding from a sonic nozzle into still air at pressure ratios up to 18 are described. The argon plasma exhibited about the same jet spreading behavior and jet structure as cold argon when the two jets were compared at the same nozzle operating pressure ratios. Approximate calculations indicate that electromagnetic forces on the plasma were insignificant for these tests. Gas dynamic and heating analyses of plasma flows are suggested as a means of estimating effective thermal properties of the plasma and studying the over-all energy exchange process. (Author)

AD-277 475 Div. 25
(TISTB/AW) OTS price $2.60

Hudson Labs., Columbia U., Dobbs Ferry, N. Y.
BIBLIOGRAPHY OF TECHNICAL REPORTS, STATUS REPORTS AND CONTRIBUTIONS.
Rept. for 1 June 51-31 Aug 61,
by R. A. Frosch. 31 Aug 61, 25p.
(Contract N6onr-27135)
Unclassified report

DESCRIPTORS: *Bibliography - Underwater sound transmission, *Underwater sound transmission. Underwater sound, Sound ranging, Reflection, Scattering, Acoustics, Instrumentation, Submarine noise, Submarines.

AD-277 495 Div. 25
(TISTP/WH) OTS price $9.10

Electrical Engineering Research Lab., U. of Illinois, Urbana.
PART I. THEORY OF FLUCTUATIONS IN A PLASMA.
PART II. WAVE PROPERTIES OF A PLASMA WITH A DOUBLY-HUMPED VELOCITY DISTRIBUTION,
by S. Ichimaru. 15 May 62, 100p. incl. illus. refs. (Scientific rept. no. 1)
(Contracts AF 19(604)7411 and AF 19(604)7473, Projs. 5561 and 4619)
(AFCRL-62-340) Unclassified report

DESCRIPTORS: *Plasma physics, *Plasma oscillation. Electrons, Density, Kinetic theory, Stability, Electromagnetic waves, Scattering.

A theory of electron density fluctuations in a two component plasma of electrons and positive ions is developed within the random phase approximation. An investigation of the properties of the growing waves in a uniform plasma with a doubly humped velocity distribution is carried out by studying the character of the boundary curves between growing waves and damped waves. (Author)

AD-277 498 Div. 25
(TISTP/WH) OTS price $8.10

Illinois U., Urbana.
DISPERSION RELATIONS FOR HYPERON DECAY,
by E. R. McCliment. May 62, 81p. incl. illus. tables, 31 refs. (Technical rept. no. 37)
(Contract Nonr-183405)
Unclassified report

DESCRIPTORS: *Hyperons, *Meson scattering. Radioactive decay, Nuclear reactions, Nucleons, Mechanics.

Contents:
Dispersion relations for hyperon decay
The absorptive parts of the amplitudes
  General considerations
  The rescattering term
  The born term
The integral equations
Results
Conclusions
Relation with leptonic decays
Application of time reversal invariance to decay amplitudes

26. PRODUCTION AND MANAGEMENT

AD-277 021 Div. 26
(TISTB/MS) OTS price $8.60

Maryland U., College Park.
FRAMEWORK FOR DECISION MAKING,
by R. Syski and J. K. Goldhaber. May 62, 96p. refs. (Technical rept. no. 2)
(Contract Nonr-59513)
Unclassified report

DESCRIPTORS: *Decision making, *Management engineering. Statistical analysis, Theory.

A framework and terminology are developed, in stages, enabling one to define formally a very general decision making problem. Aspects of the framework are examined in detail. Existing theories and problems are described in terms of this framework. Areas of further research are indicated. (Author)

AD-277 058 Div. 26, 17, 27
(TISTM/BRW) OTS price $3.60

Aerojet-General Corp., Sacramento, Calif.
STUDY OF DIFFUSION BONDING OF TUNGSTEN ALLOYS.
Quarterly rept. no. 4, Jan-Mar 62,
by George K. Hickox. June 62, 11p. illus. tables (Rept. no. 0433-01Q-4)
(Contract DA 04-200-ORD-1077)
(WAL TR 465.54/4) Unclassified report

DESCRIPTORS: *Tungsten, *Tungsten alloys - Bonding. Brazing, Diffusion, Sheets, Soldering alloys, Foils, Powder metals, Chromium, Nickel, Tantalum, Palladium, Alloys, Metals, Metal joints.

Pure Ni appears to be, because of the solid solubility of W and Ni an excellent intermediate material for diffusion-bonding tungsten. Joints brazed with pure Ni were made by preplacing a 0.001-in.-thick foil between two pieces of surface-ground W sheet. Another brazing technique that has the advantages of use of a refractory metal intermediate material in a system that meets the solid solubility requirements for good diffusion bonding is the Ni:Ta system. The technique consists of a 0.002-in.-thick foil of pure Ta sandwiched between two 0.001-in.-thick foil of pure nickel. This sandwich is placed between two pieces of surface ground tungsten. During brazing the nickel melts and establishes bonds at the tungsten and tantalum interfaces. Forty-six remelt test specimens and 14 metallographic specimens were brazed and diffusion-treated with four different braze metals and General Electric Type 218-1 W sheet. Six-hour diffusion treatments of 1800 and 2200 F were performed on specimens of each type. A set of Ni:Ta:Ni test specimens was given a 2400 F, 6-hr diffusion treatment, since 2200 F(6 hr) did not produce consistent remelt temperatures. (Author)

AD-277 179 Div. 26
(TISTP/TL) OTS price $4.60

Mechanical Technology Inc., Latham, N. Y.
GAS LUBRICATED SPHERICAL BEARINGS.
Technical rept.,
by C. H. T. Pan. 1 Apr 62, 28p. incl. illus. 10 refs. (Rept. no. MTI-62TR5)
(Contract Nonr-373000, Proj. NR 061-131)
Unclassified report

DESCRIPTORS: *Gas bearings, *Spheres, *Thin films, *Lubrication, *Partial differential equations, *Perturbation theory. Fluid flow, Boundary layer, Thrust bearings, Journal bearings, Complex variables, Integral equations, Equations.

The gas lubricated hemispherical bearing is considered theoretically. First, the isothermal Reynolds' equation for a thin film between arbitrary curved surfaces is derived. The equation

is then applied to a hemispherical bearing. External pressurization is considered by assuming a 'point' source at the pole. The self-acting effects are studied by a perturbation analysis assuming a small displacement ratio of the journal center. Extension to moderate values of displacement ratios is treated by means of the linearized ph method. Numerical results for comparison with other bearing configurations and an earlier analysis are given. (Author)

AD-277 426 Div. 26
(TISTP/WH) OTS price $12.50

Systems Research Center, Case Inst. of Tech., Cleveland, Ohio.
DYNAMIC LINEARIZATION,
by Walter J. Culver. 1 Jan 62, 161p. incl. illus. 50 refs.
(Contracts Nonr-114109 and Nonr-114112)
Unclassified report

DESCRIPTORS: *Nonlinear systems, *Linear systems - Analysis, *Computers, *Control systems, *Non-linear differential equations, *Statistical functions, *Perturbation theory, *Transformations (Mathematics), *Calculus of variations. Integral transforms, Series, Errors, Equations, Polynomials, Operators (Mathematics), Statistical processes, Statistical distributions, Numbers, Functional analysis, Probability, Operations research, Complex variables.

The conventional techniques for the linearization of nonlinear systems are presented as an introduction to the study. Dynamic statistical linearization is contrasted to these techniques and is developed as a means of representing the dynamic behavior of ZMNL (zero-memory nonlinear) systems, in order that the calculations of synthesis or control might be simplified. The method is designed to obtain a satisfactory approximation for whole ranges of inputs of a given class, such as the classes of step functions, sinusoids, and the like. This analysis, considered as the first step in a two-step attack, limits itself to a discussion of systems which can be represented in a general open-loop form. The ZMNL device within this configuration is replaced by a static nonlinear-gain term in series with an equivalent linear transfer function. Equations are developed for the best approximations to both piecewise-linear and polynomial nonlinearities, subject to both specified and unspecified magnitude distributions. (Author)

AD-277 442 Div. 26, 17
(TISTM/BRW) OTS price $4.60

Armour Research Foundation, Chicago, Ill.
FEASIBILITY STUDY OF FIBER METAL RESISTANCE BRAZING OF MOLYBDENUM SHEET.
Final rept. 25 Sep 61-25 Mar 62,
by Robert K. Nolen and John F. Rudy. 18 Apr 62, 41p. incl. illus. tables. (Rept. no. ARF 2232-2)
(Contract NOw 62-0387-d)
Unclassified report

DESCRIPTORS: *Molybdenum alloys - Brazing. Molybdenum, Sheets, Titanium alloys, Zirconium alloys, Metallic textiles, Soldering alloys, Heating, Electric currents, Microstructure, Grains (Metallurgy), Bonded joints, Soldered joints.

The feasibility of joining Mo-0.50 Ti-0.10 Zr by the fiber metal resistance brazing process was demonstrated. Metallic fiber compositions at the faying plane concentrate the heat at the interface, reducing the current required and thereby eliminating the two undesirable effects of temperature--electrode-base metal bonding and recrystallization of the base alloy. Increased remelt temperature of the resistance brazed joint, due to local composition changes within the heterogeneous brazing shim during brazing, has been demonstrated as feasible, but procedural improvements are indicated which should provide greater increases. Typical microstructures are presented for a number of brazing shim compositions, and a limited amount of mechanical property and remelt temperature data are presented. (Author)

27. PROPULSION SYSTEMS

AD-277 118 Div. 27, 26
(TISTW/RD) OTS price $10.10

Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.
THE DEVELOPMENT OF CONTOURED INTERLOCKING TAPE WOUND TITANIUM ROCKET MOTOR CASES.
Final rept.,
comp. by Robert S. Shuris. 15 May 62, 1v. incl. illus. tables. (Serial rept. no. MP 00-249)
(Contract DA 30-069-ORD-3101)
Unclassified report

DESCRIPTORS: *Rocket cases. Titanium, Pressure vessels, Manufacturing methods, Quality control, Machining, Chemical milling, Drawing (Machine processing), Heat treatment, Processing, Wire, Sheets, Rocket motors.

It was concluded that (1) The feasibility of fabricating sub-scale pressure vessels by the tape wrap method was demonstrated on a converted lathe; (2) The fabrication of the I-beam and channel shaped tapes was accomplished on the original design by the Turks Heading method, and the feasibility of producing the tapes redesigned for increased contact surface was demonstrated by rolling; (3) The structural testing of the increased contact surface design, and alternate designs showed that the tape wrap concept was feasible and that the structure required modification to compensate for non-uniform precompression stress distribution, and for the inherently lower strength of B120VCA in the presence of stress concentrations; (4) A compensated redesign using 250,000 psi Titanium tape was made which would result in a structure having a weight 9.4% lighter as compared to a monolithic case fabricated from the newly developed 300,000 psi maraging steels; (5) The coefficient of friction of B120VCA Titanium which is the controlling design parameter of the Tape Wrap concept is significantly affected by surface finish, load, and slight amounts of contamination; and (6) The strength of B120VCA Titanium is greatly affected by cold work, notches, and absorbed gases. (Author)

AD-277 276 Div. 27, 17, 4
(TISTM/TCG) OTS price $1.60

Atlantic Research Corp., Alexandria, Va.
GAS-METAL REACTION IN ROCKET NOZZLES.
Quarterly progress rept. 1 Mar-1 June 62,
by J. D. Batchelor and E. L. Olcott. June 62, 15p. incl. tables.
(Contract AF 33(616)7744)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles - Materials, *Exhaust gases - Chemical reactions, *Metals - Physical properties. Refractory materials, Alloys, Wire, Tungsten, Tungsten alloys, Additives, Thorium compounds, Oxides, Rhenium alloys, Hardness, Filaments, Microstructure, Tantalum, Tantalum alloys, Nitrides, Gases, Carbon compounds, monoxides, Carbon dioxide, Propellants, Combustion.

The reactions between refractory metal alloys and the combustion products of solid propellants are described. Four additional alloys and four additional propellants were selected. W-2% thoria and W-25% Re alloy wires were used in both filament tests and optical bomb tests. The reactivity of W-25% Re in a Co/Co2 mixture and in propellant combustion gases appeared to be less than other W alloys. Nitriding reactions had negligible effects on W, but Ta and Ta-10% W alloy showed considerable increases in hardness. Alternate procedures to test alloys not available as wire or thin sheet were considered and will be tried experimentally. (Author)

AD-277 385 Div. 27, 26
(TISTM/EJH) OTS price $2.60

Douglas Aircraft Co., Inc., Santa Monica, Calif.
MOTOR CASE FABRICATION FROM WIDE CLOSE-TOLERANCE STEEL SHEETS.
Rept. for Dec 61-Apr 62,
by Bernard B. Moss. May 62, 27p. incl. illus. tables.
(Contract AF 33(600)39653)
(ASD TR 62-7-787, suppl. to ASD TR 61-7-787-a, AD-266 514) Unclassified report

DESCRIPTORS: *Rocket cases - Manufacturing methods. Guided missiles, Sheets, Steel, Rolling mills, Electric welding, Industrial production, Heat treatment, Processing, Welds, Surface to air, Mechanical properties, Hydrostatic pressure, Test methods.

Six missile motor cases of the second stage Nike-Zeus configuration were manufactured by roll-and-weld fabrication methods. In these cases the processing technique of resistance seam welding heat treated components was employed. All six satisfactorily met the proof test at a theoretical hoop stress of 237,000 psi. (Author)

AD-277 421 Div. 27, 14, 26
(TISTA/VGW) OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
IMPROVED AIR-CHECK VALVE FOR SECOND-STAGE MOTOR OF POLARIS A-1 MISSILE.
Technical rept,
by J. M. Holloway and A. E. Barrett. 25 June 62, 17p. incl. illus. 5 refs. (Rept. no. 159-3) Unclassified report

DESCRIPTORS: *Check valves - Reliability, *Rocket motor nozzles - Check valves. Solid rocket propellants, Synthetic rubber, Rubber seals, Compressed air, Specifications, Tests, Effectiveness, Surface to surface, Guided missiles, Guided missile boosters.

The air-check valve made of neoprene which is presently being installed in a nozzle of the second-stage motor of Polaris A-1 missiles has marginal durability. This valve may be ruptured by rapid passage of air during the pre-launch pressurization of the second-stage motor. The Rubber Laboratory has developed a natural rubber stock for use in these valves in lieu of neoprene. A valve made from this stock withstands rapid passage of air approximately 8 times as long as the neoprene valve. The natural rubber valve seals satisfactorily against back flow, and adheres well to a graphite surface using epoxy resin as the bonding agent. The durability of the natural rubber valve is not reduced by accelerated aging. The natural rubber valve is suitable only for installation in the nozzle before assembly of the missile. It is too stiff for practical installation in an assembled missile. Specification requirements based on the properties of the natural rubber check valve have been prepared. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-277 069 Div. 28
(TISTB/MS) OTS price $3.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
STUDIES ON THE PERCEIVED THRESHOLD FOR MOTION. I. EFFECTS OF APERTURE DIMENSION ON THRESHOLD VELOCITY,
by Charles Fried. Feb 62, 31p. incl. illus. tables, 34 refs. (Technical memo. no. 6-62) Unclassified report

DESCRIPTORS: *Human engineering, *Motion - Detection, *Perception, *Visual perception. Theory, Measurement.

The influence of aperture dimension on the lower threshold of motion was investigated by comparing the effects of five differently sized aperture squares on motion threshold. The effect of aperture dimension was especially apparent for the smaller dimensions employed. The theoretical implications of these results were further explored in two additional experiments intended to determine if threshold values are a function of frame of reference dimensions or distance to a reference line. It was concluded that motion threshold value is a function of the latter, if a well-defined referent is provided. (Author)

AD-277 148 Div. 28
(TISTB/MS) OTS price $.50

Electronic Technology Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
TIME DISORIENTATION AND ESTIMATION IN ISOLATION.
Final rept. on Engineering Bionics, Bionic Sub-System Techniques,
by M. B. Mitchell. Apr 62, 13p. incl. illus. tables, 16 refs.
(ASD TDR 62-277) Unclassified report

DESCRIPTORS: *Perception - Time, *Sensory deprivation. Tests, Pilots, Space flight, Space medicine.

Space pilots must make accurate estimations of short time periods to avoid disaster while being deprived of usual sensory inputs for protracted periods. Tests were conducted to determine data on time estimations in isolation. Thirty-four Air Force subjects, including 10 test pilots, were isolated individually. They estimated 1 hour with lights and 1 hour without lights by depressing a button for 1 second every 6 minutes except at 30 minutes when they depressed it for 5 seconds, and at 60 minutes when they depressed it for 10 seconds. In addition, 10 subjects continued to push in the same manner for 4 hours in

light with a clock. Eight subjects continued in dark isolation without a clock for 48 hours and indicated 4 and 8 o'clock by depressing a button for 1 second, noon by depressing it for 5 seconds, and midnight by depressing it for 10 seconds. Shortest time, 1 second, was overestimated, 5 seconds was judged quite accurately, and 10 seconds tended to be underestimated, while 6, 30, 60, and 120 minutes were significantly underestimated. Twelve subjects became confused during the 2 hour estimations and gave the wrong number of rhythm of pushes. Four-hour estimations tended to become steadily shorter over 48 hours in dark isolation. The eight most accurate subjects scored significantly higher than other subjects on the Edwards Order scale and persisted in a scheme for estimating time. (Author)

AD-277 161 Div. 28
(TISTB/AW) OTS price $5.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
A STUDY OF PILOT ABILITY TO FLY HOLDING PATTERNS UTILIZING VARIOUS NAVIGATIONAL TECHNIQUES.
Final rept.,
by R. Byron Fisher, James A. Henderson, and James A. Sunkes. Feb 62, 49p. incl. illus.
(Proj. 117-1-2X)
Unclassified report

DESCRIPTORS: *Navigation. Display systems, Instrument flight, Pilots, Effectiveness.

Pilot ability to fly holding patterns utilizing various navigational techniques and readouts including use of pictorial displays was determined. The terminal area approach and the holding pattern were emphasized as part of a program also involving en route and high-altitude utilization of pictorial displays. The investigation provided information based on the pilot's ability to use pictorial displays as compared to the pilot's ability to use standard navigation panel displays. The tests were conducted using commissioned ground facilities for approaches to terminal areas employing normal ground-to-air-to-ground controller/pilot communications, including clearances to reporting fixes, holding fixes, and airport approaches. The results, based on recordings obtained using an AN/MSO-1 tracking radar, indicate no significant difference between a pilot's ability to navigate in an approach area using a pictorial display, and his ability to navigate using standard panel instruments, dual VOR and VOR/DME techniques. (Author)

AD-277 207 Div. 28
(TISTB/AW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
SAGE AIR SURVEILLANCE SUBSYSTEM EXERCISING: AN EXAMPLE OF ISOLATING HUMAN PERFORMANCE VARIABLES,
by M. M. Okanes. 28 May 62, 13p. incl. illus. 4 refs. (Rept. no. SP-236)
Unclassified report

This paper was delivered as an address to the 1961 Western Electronic Show and Convention (WESCON), San Francisco, August 25, 1961.

DESCRIPTORS: *Tracking - Analysis, *Radar operators. Air defense command, Training devices, Display systems, Effectiveness.

A methodology was designed for precisely identifying the human actions taken in an exercise utilizing synthetic inputs to the Air Surveillance subsystem of the SAGE air defense network. A model was developed which resulted in the capability to perform a diagnostic evaluation of crew performance. The model rationally ties together criteria, data specification, inputs, and performance profiles. The general goal of the Air Surveillance subsystem is to provide an accurate and timely CRT display of the existing air picture for purposes of weapons action. Criteria were developed to show the quantitative discrepancy between the raw air picture and the display provided by the Air Surveillance subsystem. A computer program was constructed to store appropriate response data gathered during an evaluation exercise. A diagnostic profile is constructed from this information which is then used for remedial training. (Author)

AD-277 287 Div. 28, 23
(TISTB/AW) OTS price $1.00

6570th Aerospace Medical Research Labs., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
MOTIVATION AND THE AUTOMATION OF TRAINING. A LITERATURE REVIEW.
Rept. on Training, Personnel, and Psychological Stress Aspects of Bioastronautics,
by Alvin Ugelow. Mar 62, 30p. 88 refs. (MRL TDR 62-15)
(Proj. 1710)
Unclassified report

DESCRIPTORS: *Teaching machines, *Learning. Effectiveness, Automation, Psychology, Group dynamics, Bibliography.

Controlling the motivation of learners in their continuing use of the new auto-instructional devices could become a serious problem, since neither the devices themselves nor the performance knowledge they provide seems sufficient to maintain extended participation in the instruction. A selective review of the literature on knowledge of results, praise and reproof, competition, task interruption, and readability suggests techniques for better controlling such participation. Potentially useful applications are discussed, and limited try-out of variations, both within the program and instructional environment, is encouraged. (Author)

AD-277 288 Div. 28
(TISTB/MS) OTS price $.50

Behavioral Sciences Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
EFFECTS OF SIMULATED WEIGHTLESSNESS UPON POSITIONING RESPONSES.
Rept. on Human Factors in Advanced Flight,
by William N. Kama. Dec 61, 12p. incl. illus. tables, 4 refs.
(Proj. 7184)
(ASD TR 61-555) Unclassified report

DESCRIPTORS: *Positioning reactions, *Reaction time, *Motor reactions, *Weightlessness. Simulation, Human engineering.

The speed and accuracy of positioning movements as functions of distance, direction, and mass were investigated under simulated weightless conditions. Subjects seated on a frictionless device made blind positioning movements by sliding each of two frictionless masses (1000 or 7000 grams) various distances (10, 20, and 40 cm) either left-to-right or near-to-far. Both speed and accuracy decrease with distance; left-to-right movements take longer, but are more accurate than near-to-far movements. Speed decreases with increased mass. With minor exceptions, the effects are similar to those noted when fixed subjects position weightless objects. The responses of fixed subjects were slower, but more accurate, and were not affected by the variable of mass. (Author)

AD-277 490 Div. 28
(TISTB/AW) OTS price $4.60

Human Factors Research, Inc., Los Angeles, Calif.
A STUDY OF TARGET DETECTION BY SONAR OPERATORS.
Rept. on Human Factor Problems in Anti-Submarine Warfare,
by C. H. Baker and A. Harabedian. June 62, 34p. incl. illus. tables, 25 refs. (Technical rept. no. 206-16)
(Contract Nonr-264900, Proj. NR 153-199)
Unclassified report

DESCRIPTORS: *Detection - Effectiveness, *Sonar operators. Sonar targets, Simulation, Display systems, Anti-submarine warfare, Target position indicators.

The relative efficiency with which sonar operators can detect sonar targets presented on both auditory and visual displays was determined under conditions in which the operators were alerted to the imminent appearance of a target, and also in a rather prolonged watchstanding situation when they were not alerted. Twenty-four sonar operators were employed as subjects. Data are reported with respect to the decrement in detection performance during prolonged watchstanding, and also with respect to consistency of performance in correctly and falsely reporting targets. In addition, the effect of target location on efficiency of detection performance is discussed. (Author)

AD-277 497 Div. 28
(TISTB/MS) OTS price $7.60

Indiana U., Bloomington.
PROBABILITY LEARNING.
Technical rept.,
by W. K. Estes. 1 May 62, 72p. incl. tables, 117 refs.
(Contract Nonr-90816)
Unclassified report

DESCRIPTORS: *Learning - Theory. Verbal behavior, Probability.

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-277 277 Div. 29, 22
(TISTM/EJH) OTS price $2.60

Army Arctic Test Board, Fort Greely, Alaska.
CHECK TEST OF FILTER UNIT, GAS-PARTICULATE, TANK, FIVE-MAN, E37R2.
15 May 62, 22p. incl. illus. (Proj. no. ATB 2-12)
Unclassified report

DESCRIPTORS: *Particulate filters, *Air intake filters, *Tanks. Protective clothing, Breathing masks, Military requirements, Arctic regions, Climatic factors, Air conditioning equipment.

The particulate filter consists of M1A1 precleaner; an E45,20-CFM, particulate filter; an electric motor with fan; and 2 E44, 10-CFM, gas filters. An installation kit is provided with each unit; flexible tubing and noses are used to duct the air to the crew positions. A rheostat controlled heater is mounted at each crew member's station to warm the air supply. A combat vehicle protective mask, E56R4 is used with the unit. Mask spectacles, winterization kit, spare parts kits and hood are included in the equipment. Except for the excessive cold air transmitted to the loader's position, and other adjustment, the filter unit was satisfactory with respect to function suitability, operation, comfort and safety at the tank commander, gunner and drive stations, maintenance, durability and reliability. It is recommended for use under arctic conditions.

30. RESEARCH AND RESEARCH EQUIPMENT

AD-277 048 Div. 30, 15
(TISTP/JW) OTS price $13.00

Dikewood Corp., Albuquerque, N. Mex.
AN INFORMATION THEORY OF LEARNING FOR COMMUNICATIONS VOLUME I: A THEORY OF SELF-EVALUATING DISCRETE COMMUNICATION SYSTEMS.
Final rept.,
by S. D. Stearns. 6 Apr 62, 180p. incl. illus.
(Rept. no. DFR-1018)
(Contract AF 30(602)2391, Proj. 4519)
(RADC TDR 62-255, vol. 1) Unclassified report

DESCRIPTORS: *Communication systems, *Information theory, *Mathematical logic. Analysis, Quality control, Data processing systems, Probability, Learning.

The discrete communication system is used as a model for studying self-evaluation. An evaluator is assumed to have access to some of the following types of information from the system, and then to discover other properties during the communication process: the received message; the transmitted message; the statistical properties of the received and the transmitted message, and the channel noise. A mathematical structure is developed within which systems with self-evaluating properties may be analyzed. Features of this structure are: A credibility measure for the parameters being evaluated. In the form of a subjective probability, it is derived by extending Bayes' Theorem, as applied to processes of inductive inference, to the processes of evaluation described above. A measure of learning or amount learned by the evaluator about the parameters being evaluated. This measure is derived by applying Shannon's entropy, used as a measure of uncertainty, to the credibility function mentioned above. A method for determining when the unknown properties to be evaluated can eventually be determined to at least a finite number of choices. These features are used in the analysis of different models of self-evaluating systems. Solvability effectively determines when evaluation can take place, and the learning measure gives an indication of ''how much'' evaluation can take place before some significant event occurs.

AD-277 055 Div. 30
(TISTA/WAW) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
COMPENSATION OF DYNAMIC STING EFFECTS IN HOTSHOT

FORCE MEASUREMENTS,
by E. E. Edenfield and R. L. Ledford. June 62, 26p. incl. illus. 2 refs. (AEDC TDR 62-122)
(Contract AF 40(600)800)
Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, *Shock tubes - Instrumentation. Balances, Errors, Reduction, Vibration, Design, Tests, Theory, Strain gages.

A system which can substantially reduce the detrimental effects of sting vibrations on force measurements made in the von Karman Gas Dynamics Facility's Hotshot wind tunnels has been developed and proved effective. A description of this system and its theory of operation are presented along with the results of evaluation tests. (Author)

AD-277 129 Div. 30
(TISTW/RD) OTS price $11.00

Aberdeen Proving Ground, Md.
HISTORICAL MONOGRAPH ELECTRONIC COMPUTERS WITHIN THE ORDNANCE CORPS,
by Karl Kempf. Nov 61, 139p. incl. illus. tables, refs.
Unclassified report

DESCRIPTORS: *Computers - History. Digital computers, Solid state physics, Costs, Programming, Fire control computers, Gunnery, Ordnance laboratories, Artillery, Ordnance.

Contents:
Pre-electronic computing devices
Eniac
Edvac
Ordvac
Brlesc
Computers for solving gunnery problems
The computer tree

AD-277 198 Div. 30
(TISTA/WAW) OTS price $2.60

Rensselaer Polytechnic Inst., Troy, N. Y.
DESIGN AND CHARACTERISTICS OF A SMALL HYPERSONIC SHOCK TUNNEL COMBUSTION DRIVER.
Rept. on Research on Aerodynamic Flow Fields,
by H. E. Duffy and D. F. Rogers. Mar 62, 15p. incl. illus. 3 refs.
(Contract AF 33(616)7312, Proj. 7064)
(ARL 62-307) Unclassified report

DESCRIPTORS: *Shock tubes - Gas generating systems, *Hypersonic wind tunnels - Gas generating systems, *Gas generating systems. Shock waves, Combustion, Combustion chambers, Pressure, Temperature, Helium, Hydrogen, Oxygen, Ignition, Tests, Design.

A combustion driver for a small Hypersonic Shock Tunnel has been designed and tested. Combustion pressure-time histories for stoichiometric hydrogen and oxygen mixtures diluted with varying percentages of helium have been obtained. Tests indicate that the combustion results are repeatable and peak combustion pressure and temperature are controllable within a wide range. The dimensions of combustion drivers appear to have an important effect in that rough burning conditions, reported by other investigators, have not been noticeable except at very low percentage concentrations of helium. (Author)

AD-277 212 Div. 30
(TISTB/MS) OTS price $3.60

Texas U., Austin.
MACHINE LANGUAGE TRANSLATION STUDY.
Quarterly progress rept. no. 11, 1 Nov-31 Jan 62 on Research on the Machine Translation of German,
by W. P. Lehmann and E. D. Pendergraft.
31 Jan 62, 39p. incl. illus. 7 refs.
(Contract DA 36-039-sc-78911)
Unclassified report

DESCRIPTORS: *Machine translation. Language, Probability, Coding.

This report describes progress toward implementation of the U. S. Army Signal Corps Language Translation System, in the period from 1 November 1961 to 31 January 1962. Methods for coding linguistic data as a hierarchy of construction rules are presented. The data can be compiled into a tree-graph whose nodes are decision points in a generalized analysis algorithm. (Author)

AD-277 289 Div. 30, 9
(TISTA/WAW) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
FLOW CHARACTERISTICS OF A 40-INCH WIND TUNNEL AT MACH NUMBERS 1.5 TO 6,
by Jack D. Coats. June 62, 29p. incl. illus. table, 4 refs. (Rept. no. AEDC TDR 62-130)
(Contract AF(600)800)
Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels - Aerodynamics, *Supersonic wind tunnels - Aerodynamics. Supersonic flow, Hypersonic flow, Calibration, Tests, Supersonic nozzles.

The flexible steel plate which forms the lower nozzle wall of the 40-in. Supersonic Tunnel of the von Karman Gas Dynamics Facility was damaged in October 1961. A brief description of the damage and repair of the plate is presented with flow characteristics obtained during a calibration program conducted after completion of the repairs. The calibration showed that the uniformity of the test-section flow characteristics was not adversely affected by the repair which included the use of a pattern of bolt heads protruding above the surface of the plate in the subsonic region of the nozzle. (Author)

AD-277 414 Div. 30
(TISTB/AW) OTS price $1.60

Naval Research Lab., Washington, D. C.
ENCORES FOR ACT I SYSTEM FOR LGP-30 DIGITAL COMPUTER COMPILER,
by Alan H. Rich. 1 June 62, 17p. (NRL rept. no. 5784)
Unclassified report

DESCRIPTORS: *Programming - Design. Digital computers.

The Algebraic Compiler and Translator I System for the LGP-30 digital computer was modified and expanded for greater versatility. A location symbols table is generated at a new location, providing space for one of two decimal program and references printout routine. A 63-symbol operations table includes non-input typewriter operation symbols, breakpoint symbols, a compatible hex or alpha-numeric output symbol, a binarization of address symbol, a flexible program input symbol, an integer-trim symbol, and a trace-one-intermediate-result symbol. Two alternate subroutines, located in unused space at the time of computing, utilize program input routine. (Author)

AD-277 417 Div. 30
(TISTP/TL) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
BILINEAR PATTERN CLASSIFIERS,
by John F. Kampmeier. 12 Mar 62, 26p. incl. illus. table, 17 refs. (Research rept. no. PIBMRI-996-62)
(Contract AF 18(600)1505)
(AFOSR-2417)
Unclassified report

DESCRIPTORS: *Classification, *Machines - Design, *Digital computers, *Linear systems, *Nonlinear systems, *Switching circuits, *Functions. Learning, Feedback, Electrical networks, Algebra, Integral transforms, Theory, Computer logic, Inequalities, Polynomials, Matrix algebra.

An analysis of the requirements for a portion of a general pattern recognition system, and the design of a classifier which meets those requirements are presented. The problem of pattern recognition is divided into two parts, measurement and classification. Classification alone is considered in this report. It is shown that the function of a classifier can be reduced to the realization of an arbitrary, n-variable switching function. A further requirement upon the classifier is that it must be capable of learning through experience. Several methods of designing a classifier with learning ability are found either to be unreasonably complex or to not have sufficient flexibility in realizing switching functions. A new type of network is introduced which meets the requirements for a practical classifier. The classifier network becomes capable of learning if feedback is added. Application of Laplace transform theory shows that correct recognition of patterns occurs after several presentations of all patterns to be classified. (Author)

AD-277 453 Div. 30, 8, 9
(TISTA/WAW) OTS price $9.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
A DESCRIPTION OF THE CONTROL AND READOUT SYSTEM FOR A FORCED-OSCILLATION BALANCE,
by M. L. McKee. June 62, 109p. incl. illus. tables, 10 refs. (Rept. no. AEDC TDR 62-69)
(Contract AF 40(600)800)
Unclassified report

DESCRIPTORS: *Supersonic wind tunnels - Instrumentation, *Transonic wind tunnels - Instrumentation, *Data processing systems - Design. Balances, Oscillation, Stability, Servo systems, Servomechanisms, Theory, Pitch, Oscillators, Electronic circuits, Mathematical analysis, Digital computers.

A control and data acquisition system was built and used in forced-oscillation tests of aerodynamic models in the 16-Foot Transonic and 16-Foot Supersonic Tunnels of the Propulsion Wind Tunnel Facility, AEDC. The drive is electrohydraulic and is controlled by a position feedback loop. The data acquisition system provides the information required for the on-line determination by a digital computer of the degree of model dynamic stability or instability in pitch. The design, analysis, theory of operation, and general fabrication of the system are covered. (Author)

AD-277 470 Div. 30
(TISTP/TL) OTS price $3.60

Development Labs., Inc., Santa Monica, Calif.
(No title).
Quarterly rept., no. 1, 15 Mar-15 June 62. 15 June 62, 32p. incl. illus. tables, refs.
(Contract NOw 62-0770-c)
Unclassified report

DESCRIPTORS: *Vortices, *Gyroscopes, *Gases, *Instrumentation. Velocity, Measurement, Tests, Heaters, Detectors, Thermocouples, Resistance thermometers, Ions, Integral transforms, Numerical analysis, Integration.

The purpose of this study is the development of an angular rate indicating instrument based on measuring the angular rate of an artificially induced vortex. The measurement of the change in rate of the artificially induced vortex is the measure of an externally superimposed rotation on the system. The successful achievement of this development would provide an instrument to replace gyroscopes. (Author)

AD-277 493 Div. 30
(TISTB/AW) OTS price $16.00

Melpar, Inc., Falls Church, Va.
A STUDY OF GENERALIZED MACHINE LEARNING.
Final rept., Dec 60-Jan 62,
by E. B. Carne. Apr 62, 238p. incl. illus. tables, 113 refs.
(Contract AF 33(616)7682, Proj. 4160)
(ASD TDR 62-166)
Unclassified report

DESCRIPTORS: *Digital computers - Learning, *Digital systems. Special functions, Sequences, Sequential analysis, Switching circuits, Trigger circuits, Electrical networks, Nerves, Simulation, Reliability, Games theory, Information theory, Coding, Feedback, Mathematical prediction.

Results of theoretical and simulation studies of generalized machine learning are presented. Two basic types of networks were studied; the ARTRON networks, and the Self-Organizing Binary Logical Network. Individual results along with comparative results are given. The results of this study are as follows: machines are capable of learning; and machines may be constructed which learn efficiently, i.e., with minimum information required for learning. A description of a breadboard implementation and results of some games are presented as proof-of-principle. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-277 116 Div. 31, 9
(TISTE/CRJ) OTS price $6.60

Technical Research Group, Syosset, N. Y.
THE LATERAL STABILITY OF THE HYDROSKIMMER CRAFT,
by H. S. Bluston. 15 Jan 62, 39p. incl. illus. 14 refs. (Rept. no. TRG-158-SR-1)
(Contract NObs-4433)
Unclassified report

Division 32 - MISCELLANEOUS ARTS AND SCIENCES
Division 33 - TRANSPORTATION

DESCRIPTORS: *Ground effect, *Boats. Stability (Lateral), Motion, Yaw, Roll, Jets, Analysis, Determination, Mathematical analysis, Integral transforms, Numerical analysis.

An analysis is presented of the lateral stability of the Hydroskimmer over calm water. This is a 20-ton peripheral jet hovercraft with a cruising speed of 70 knots and a crusing height of 1.5 ft. The equations of motion of a non-surface-piercing ground effect machine in lateral motion are stated and estimates of the lateral stability derivatives are obtained. The equations of motion are reduced, for free motion, to a quartic equation in p (the Laplace transform variable) known as the System Characteristic Equation. The roots of this equation, which determine the craft's lateral stability, are obtained numerically and in terms of the vehicle stability derivatives. The modes are also calculated and the motion is shown to consist of two essentially uncoupled, lightly damped modes. The first mode has low frequency and represents a yaw-sideslip motion with little roll. The second mode has a somewhat higher frequency and represents a rolling motion with little yaw or sideslip. Finally the most important derivatives and craft parameters are found and the stabilization problem briefly discussed. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

No Entries

33. TRANSPORTATION

No Entries

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

BIBLIOGRAPHY

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General Electric Co., Cincinnati, Ohio.
SOVIET SCIENTIFIC AND TECHNICAL LITERATURE. Selected Bibliography, Volume I. Rept. on Contract AT(11-1)-171. 2 Apr 62, 346p.

OTS SB-484 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
UNCONVENTIONAL POWER SOURCES. Feb 62, 19p. 427 refs. OTS Selective Bibliography SB-484.

DESCRIPTORS: *Power, Sources, Sea Water batteries, Electric power production, Nuclear power plants, Nuclear propulsion, Rocket propulsion, Free radicals, Solar cells, Fuel cells, Thermoelectricity, Magnetohydrodynamics, Bibliography, Power supplies.

Lists 427 foreign and domestic references on direct and indirect electrical energy conversion, chemical conversion of waste heat into electrical energy, ion and plasma propulsion systems, electrostatic and magnetogasdynamic propulsion, photon rockets, sea water batteries, thermionic isotopic power systems, maritime and aircraft nuclear power systems, chemical and thermal power systems, power from free radicals, solar cells, fuel cells, thermoelectricity, charged colloids, and magnetohydrodynamics among other subjects. (Author)

AGRICULTURE

TID-15341 $6.60

Inter-American Inst. of Agricultural Sciences, Turrialba (Costa Rica).
THE APPLICATION OF NUCLEAR ENERGY TO AGRICULTURE, by H. Boroughs. Rept. on Contract AT(30-1)-2043. 1 Mar 62, 62p. 9 refs.

Plant Cultivation

PB 160 346 $1.60

Naval Medical Research Inst., Bethesda, Md.
INFECTIVITY AND GALL SIZE IN TOMATO AND CUCUMBER SEEDLINGS INFECTED WITH MELOIDOGYNE INCOGNITA VAR. ACRITA (ROOT-KNOT NEMATODE), by V. H. Dropkin. Vol. 11, p. 993-1010. 21 Aug 53, 19p. 8 refs. Research rept. on Project NM 005 048.21.02.

DESCRIPTORS: *Parasitic infections, *Nematodes, *Meloidogyne, Plants, *Vegetables, Tomatoes, Potatoes.

Three lines of Meloidogyne incognita var. acrita have been carried by transfer at each generation of single larvae to marked roots of a clone of Allgold sweet potato plants. Two of the lines are at their 12th generation and one is at its 5th. Measurements of infectivity and of gall size were made for possible use in differentiating genetic variants of this nematode. The infectivity of the species used was less for Marglobe tomato seedlings than for Improved Long Green cucumber seedlings, both in exposures of one larva at a time and in exposures of 25 larvae at a time. Gall areas were measured by a photographic and planimetric technique. A high positive correlation is shown between gall area and number of larvae in the gall. The response of the root to the presence of the nematode is a local one and seems to be related to the amount of stimulation provided by each nematode. (Author)

TID-15368 $1.10

New York State Coll. of Agriculture, Ithaca.
THE LOSS OF ORGANIC AND INORGANIC MATERIALS FROM ABOVE GROUND PLANT PARTS, WITH ESPECIAL REFERENCE TO DECONTAMINATION OF PARTS UTILIZED FOR FOOD, by H. B. Tukey, Jr. Progress rept. on Contract AT(30-1)-2598. 26 Mar 62, 7p.

ASTRONOMY

Astrophysics

NASA N62-13105 $4.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
CATALOG OF PRECISELY REDUCED OBSERVATIONS, NO. P-3. Rept. on Grant NsG-86-60. 23 Apr 62. 48p. 4 refs. SAO special rept. 91.

NASA N62-13090 $1.10

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A NOTE ON THE MASS OF BETA LYRAE, by Su-Shu Huang. 1962. 7p. 9 refs.

NASA N62-13809 $1.10

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
OCCURENCE OF ABRUPT WARMING IN THE STRATOSPHERE AND SOLAR ACTIVITY, by K[aichi] Maeda. 1961. 10p. 13 refs.

NASA N62-13879 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A STELLAR MODEL OF MIXED OPACITY AND ITS VARIATIONS WITH THE MASS, CHEMICAL COMPOSITION, OPACITY COEFFICIENTS, AND ENERGY-GENERATION COEFFICIENT, by Su-Shu Huang. July 62. 21p. 14 refs. Rept. NASA TN D-1414.

NASA N62-12968 $5.60

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A STUDY OF THE HYDROGEN, HELIUM, AND HEAVY NUCLEI IN THE NOVEMBER 12, 1960 SOLAR COSMIC RAY EVENT, by S. Biswas, C. E. Fichtel, and D. E. Guss. 1962, 60p. 31 refs. Rept. X-611-62-27.

NASA N62-12969 $17.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THEORETICAL MODELS FOR THE SOLAR-CYCLE-VARIATION OF THE UPPER ATMOSPHERE, by Isadore Harris and Wolfgang Priester. 24 Apr 62. 276p. 7 refs.

NASA N62-12492 $5.60

High Altitude Observatory, Boulder, Colo.
PHYSICAL CONDITIONS IN LIMB FLARES AND ACTIVE PROMINENCES. VI. SELECTIVE EXCITATION CONDITIONS. (APPENDIX:) REMARKS ON THE NATURE OF SOLAR FLARES, by Einar Tandberg-Hanssen and James W. Warwick. Grant NsG-92-60. 1962, 59p. 30 refs.

NASA N62-12503 $1.10

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
LUNAR TAKEOFF, by Richard R. Burley and Richard J. Weber. 1962, 5p. 1 ref.

NASA N62-13847 $1.10

Michigan U., Ann Arbor.
RADIO ASTRONOMY EXPERIMENTS FROM SATELLITES AND ROCKETS, by Fred T. Haddock. Status rept., 1 Feb-30 Apr 62, on NASA Contract NASw-54. 31 May 62. 10p. Rept. 02932-10-S.

NASA N62-13715 $1.10

Minnesota U. School of Physics, Minneapolis.
GAMMA-RAY ASTRONOMY IN SPACE IN THE 50-KEV TO 3-MEV REGION, by L. E. Peterson and R. H. Howard. Rept. on Contract NASw-56. Sep 61. 10p. 19 refs. Rept. CR-39.

NASA N62-12490 $1.10

National Aeronautics and Space Administration, Washington, D. C.
EXPERIMENTS FOR THE UNMANNED SCIENTIFIC EXPLORATION OF THE MOON, by Newton W. Cunningham. 1961, 10p.

NASA N62-13704 $2.60

Rand Corp., Santa Monica, Calif.
STUDIES OF THE PHYSICAL PROPERTIES OF THE MOON AND PLANETS. Quarterly technical progress rept. no. 7 on Contract NAS7-100. Apr 62. 21p. refs. Rept. AR-15-JPL.

NASA N62-13114 $1.60

Yerkes Observatory, Williams Bay, Wis.
THE OH NIGHTGLOW EMISSION, by L. Wallace. Research paper no. 2 on Contract AF 19(604)3044 and Grant NsG-118-61. Jan 62, p. 1-16. 57 refs.

Reprint from the Journal of Atmospheric Science 19:1-16, 1962.

BEHAVIORAL SCIENCES

Human Engineering

PB 181 356 $0.50

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson AFB, Ohio.
MAXIMUM TORQUE EXERTABLE ON KNOBS OF VARIOUS SIZES AND RIM SURFACES, by Earl D. Sharp. Final rept. June 59-Oct 60, on Human Performance in Advanced Systems. Mar 62, 15p. 6 refs. MRL-TDR-62-17.

DESCRIPTORS: *Control knobs, *Torque, Tactual perception, *Human engineering

This study was initiated to determine the maximum torque a seated operator can apply in turning a knob with the bare thumb and fingertips of his right hand. It was also desirable to develop a procedure by which a given knob or set of knobs may be evaluated with respect to maximum torque exertable. A set of 60 knobs, each 1/2 inch thick, was used. The knobs had 20 diameters from 1/8 to 5 inches. For each diameter there were three different rim surfaces: smooth, rectangular-knurl, and diamond-knurl. Each of 45 subjects was tested with every diameter-surface combination. In addition, 15 of the subjects repeated the experiment. The maximum torque exertable increased with knob diameter. For all knob sizes, rectangular- and diamond-knurled knobs permitted greater torques than did smooth knobs. Very little difference in maximum torque exertable was observed between the rectangular- and diamond-knurled surfaces. (Author)

NASA N62-13708 $4.60

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
AN EXPERIMENTAL STUDY AND DEVELOPMENT OF ANALYSIS TECHNIQUES FOR HUMAN OPERATOR DYNAMIC CHARACTERISTICS. Quarterly progress rept. no. 3, 15 Dec 60-15 Mar 61, on NASA Contract NASw-185. 15 Mar 61. 48p.

Personnel and Training

PB 160 726 $5.60

Human Resources Research Office, George Washington U., Washington, D. C.
STUDIES IN RADIOTELEGRAPHY, by Charles Windel, Murray Sidman (Army Medical Graduate School, Walter Reed Army Medical Center), and Fred S. Keller (Columbia U.) Rept. on Contract AF 18(600)115. [1952] 53p. 101 refs. AD-90 228.

DESCRIPTORS: *Radio operators, *Training, *Radio signals, Aptitude tests, Applied psychology, Telegraph systems, *Coding, *Telegraph signals, Learning.

The field of code investigation has been subdivided into (a) learning to receive, (b) learning to send, and (c) code aptitude. The discussion of these areas is preceded by a review of relatively recent attempts to standardize some of the terms used loosely in reference to code performance, and of suggested improvements in standard Morse code practices.

PB 160 357 $6.60

Naval Medical Research Inst., Bethesda, Md.
INVESTIGATION AND IMPROVEMENT OF SYSTEMS FOR SIMULATING INSTRUMENT CONDITIONS IN AVIATION INSTRUMENT FLIGHT TRAINING (INSTRUMENT FLIGHT SIMULATION), by Norman Lee Barr and Ray C. Hackman. Vol. 14, p. 107-172. 27 Jan 56, 66p. 2 refs. Research rept. on Project NM 001 056.07.04.

DESCRIPTORS: Aviation personnel, *Training, *Instrument flight, Simulation, *Flight simulators, *Flight instruments.

This report is concerned with an evaluation of available methods for simulating instrument flight, with special reference to optical and operational requirements, and the report of two improved methods. (Author)

Psychology

PB 160 741 $6.60

City Coll. of the City of New York.
THE ACCEPTANCE OF NEW REFERENCE GROUPS, by Ruth E. Hartley. Technical rept. no. 3 on Contract Nonr-1597 (01). 15 Nov 56, 67p. 30 refs. AD-123 939.

DESCRIPTORS: *Group dynamics, Acceptability, Behavior, Attitudes, Perception, Psychology.

Contents:
Developing the instrument to measure acceptance
Perceptual aspects
Expectations and assessment of actual experience
Fulfillment of individual goals
Interrelationships among selected variables
(See also PB 157 164)

PB 160 746 $1.60

Kresge Eye Inst., Detroit, Mich.
A STUDY OF DYNAMIC VISUAL ACUITY, by Elek Ludvigh and James W. Miller. Rept. on Contract Nonr-586(00). 4 Mar 53, 16p. 4 refs. Joint Proj. rept. NM 001 075.01.01; AD-15 173.

DESCRIPTORS: *Visual acuity, Test methods, *Visual perception, Eye, *Visual thresholds, Personnel, Selection.

The visual acuity of 18 subjects deteriorated as the angular velocity of the test object moving in a horizontal plane was increased from 10^{o} to 170^{o}/sec. The visual acuity was evaluated in terms of static and dynamic visual acuity. Some individuals with approximately the same static acuity differed significantly in their dynamic acuity.

PB 160 690 $5.60

Minnesota U., Minneapolis.
SEMANTIC GENERALIZATION AS A RELATED WORD ASSOCIATION, by Walter D. Mink. Doctoral thesis. Technical rept. no. 17 on Studies on the Role of Language in Behavior, Contract N8onr-66216. June 57, 54p. 35 refs. AD-135 147.

DESCRIPTORS: Psychology, Behavior, *Verbal behavior, *Language, Reaction (Psychology), *Transfer of training, Learning

Subjects were taught to press a lever for each word on a list. Then a second list was presented which contained (1) the original words, (2) associates to the original words which occur with known frequency, and (3) unassociated control words. Subjects were instructed to press the lever only for words which were recognized from the original list. Generalization (transfer) was considered to have occurred if the number of responses to the associated words was significantly greater than to the control words. Three such experiments gave conclusive evidence of generalization and confirmed the general technique. Four further experiments showed the importance of the direction and frequency of the association. Generalization effects were most marked when the stimulus word of an associated pair was used in the learning list and the generalization to its response was measured.

PB 160 350 $1.60

Naval Medical Research Inst., Bethesda, Md.
THE INFLUENCE OF SIMULATED MUTILATION UPON THE PERCEPTION OF THE HUMAN FIGURE, by Warren J. Wittreich and Keith B. Radcliffe, Jr. Vol. 12, p. 241-250. 3 June 54, 11p. 9 refs. Research rept. on Project NM 004 008.04.02.

DESCRIPTORS: Behavior, Emotions, *Visual perception, Visual thresholds, *Lenses, Distortion, *Amputees, Casualties.

Does the emotional reaction associated with viewing a multilated figure influence the perception of that figure? This problem is investigated by determining if the appearance of a figure with simulated mutilation changes less under conditions of induced aniseikonic optical distortion than the appearance of a normal figure. A "threshold for distortion" is calculated for

both figures by presenting a series of graded aniseikonic lenses to the subject according to the psychophysical method of limits. The threshold for the mutilated figure is significantly higher than for the normal figure. This is interpreted to mean that the subject, when viewing the mutilated figure, places greater emphasis on the uniocular (undistorted) cues in order to construct a percept which provides a basis for effective future action. (Author)

BIOLOGICAL SCIENCES

PB 181 349 $0.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska. OBSERVATIONS ON THE FROG RANA SYLVATICA IN ALASKA, by Kjell Johansen. Oct 61, 10p. 12 refs. Technical rept. 61-16.

DESCRIPTORS: Amphibians, *Frogs, Temperature, Oxygen consumption, *Physiology.

Rana sylvatica were collected during August and September in the Fairbanks area of Alaska. The majority of those collected were hatched within the year, the ratio of young to old frogs being about 6 or 8 to 1. It was observed that the abundance of frogs was fairly constant during August, that it declined during the latter part of September and that it disappeared with a three-day period of early October. When kept in a large tank within the laboratory a surprising degree of cannibalism was noted. Thus, over a two-day period , four large frogs consumed about 20 small frogs. When the ambient temperature was abruptly dropped from 25° to 3° C, the frogs exhibited a marked increase in activity that lasted up to three hours. When the temperature was dropped in 5° and 10°C steps, the activity was less frequent. When exposed to air temperatures of 3° to 5°C for two hours and then turned over on their backs, it required 1.13 seconds for the frogs to turn over. After four months at this same temperature the time taken to turn over was 1.45 seconds. In both instances the turnover movements were well-coordinated. With increasing temperatures an exponential relationship of oxygen consumption to temperature was observed. Activity associated with an abrupt decline in temperature was accompanied by an increased oxygen consumption. (Author)

PB 160 355 $1.10

Naval Medical Research Inst., Bethesda, Md. THE INTERACTION BETWEEN ACETYLCHOLINE AND ATROPINE ON THE ISOLATED FROG HEART, by Donald J. Jenden and James R. Tureman. Vol. 13, p. 795-804. 14 Nov 55, 10p. 7 refs. Research rept. no. Project NM 000 018.12.01.

DESCRIPTORS: Drugs, *Acetylcholines, *Atropine, Dissociation, Physiology, *Heart, Frogs.

The isolated frog heart was used to study the antagonism between atropine and acetylcholine. The formula derived by Gaddum (3) for competitive antagonism from the law of mass action was extended and a simple graphical interpretation was used to analyse the experimental data. A consistent estimate of the parameter $\frac{1}{n} \log K_2$ was obtained, where K_2 is the dissociation constant of atropine and the receptors, and n is a constant of undetermined significance which is approximately unity. The mean value of $\frac{1}{n} \log K_2$ was 9.035 ± 0.096 ($P = .05$). The estimation of dissociation constants between drugs and their receptors as a means of comparing pharmacological activity is discussed, and it is concluded that this is a desirable method for studying structure-activity relationships. (Author)

NASA N62-13729 $4.60

Stanford Research Inst., Menlo Park, Calif. A TRANSISTORIZED REAL-TIME COMPUTER FOR TRANSFORMATION OF VECTORCARDIOGRAPHIC DATA, by Brian King. Final rept. on NASA Contract NAS2-526. Jan 62. 44p. 8 refs. SRI Proj. 3603.

Anatomy and Physiology

PB 160 311 $2.60

Naval Medical Research Inst., Bethesda, Md. CHARACTERISTICS AND POTENTIALS OF LONG-TERM CULTURES OF HUMAN SKIN, by C. Andrew L. Bassett, Dan H. Campbell (Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech) and others. Vol. 13, p. 509-528. 15 Aug 55, 21p. 25 refs. Research rept. on Project NM 007 081.10.11.

DESCRIPTORS: *Culture media, *Skin, Growth, *Transplantation, Serum, Cells (Biology), Toxicity, Tissues (Biology).

Adult and fetal human skin have been maintained, in tissue culture, in states of continuous proliferation for periods of 2 years. During this period, observations have been made on the morphologic modulations occurring in the epithelial cell population. An immune globulin has been prepared against a mixed culture of adult human skin cells. This globulin has demonstrated a marked cytotoxic effect upon the cell strain originally constituting the antigen. It further has shown cytotoxic activity against cultures of adult and fetal human cells derived from organs other than skin. No cytotoxic activity could be demonstrated against long term cultures of mouse tissues other than skin. The cytotoxicity of an immune globulin prepared against human placenta has been assayed in mixed cultures of adult and fetal human skin. This globulin demonstrated a consistent ability to selectively, though temporarily, control fibroblast population. The isolation of a pure culture of human skin epithelial cells is being pursued. Initial indications have been obtained that mixed cultures of human skin can be transplanted back to the human and that these cultures can be considered "to take" initially. The physiologic adequacy and survival time of these grafts of homogenous skin cells from tissue culture are being sought.

PB 160 294 $1.60

Naval Medical Research Inst., Bethesda, Md.
HIGH PRESSURE OXYGEN EFFECTS ON THE TRANSPORT OF POTASSIUM, SODIUM, AND GLUTAMATE IN GUINEA PIG BRAIN SLICES, by S. A. Kaplan and S. N. Stein. Vol. 14, p. 819-830. 30 Oct 56, 13p. 29 refs. Research rept. on Project NM 004 005.09.02.

DESCRIPTORS: High pressure research, Nervous system, Cerebral cortex, *Brain, *Oxygen, Biochemistry, *Potassium, *Sodium, *Glutamic acid, Inorganic substances, Ions

Slices of guinea pig brain cortex were suspended in a medium containing inorganic ions (in concentrations similar to those present in plasma), glucose and glutamate. They were shaken for 90 minutes at 37°C. in oxygen, the partial pressure of which was varied from 1 to 11 atmospheres absolute. Raising the pressure above 4 atmospheres absolute resulted in the slices losing considerable quantities of potassium. At 6 atmospheres absolute the slices accumulated considerably less glutamic acid than they did at 1 atmosphere. These findings suggest that brain cells are unable to maintain their normal concentrations of these two substances when exposed to oxygen at high pressure and suggest a possible mechanism for the origin of the disturbances of function in the central nervous system of animals exposed to high pressures of oxygen. (Author)

PB 181 350 $0.50

Tufts U. School of Medicine, Boston, Mass.
THE ROLE OF INHIBITORY MECHANISMS IN THE PHYSIOLOGICAL REGULATION OF LIPOGENESIS, by E. J. Masoro, Edith Porter, and Helen Korchak. Oct 61, 15p. 16 refs. AAL Technical rept. 61-25.

DESCRIPTORS: *Liver, Metabolism, *Lipids, Synthesis, Enzymes, Coenzymes, Temperature, Inhibition

The quantitative importance of inhibitory mechanisms in the regulation of hepatic lipogenesis was investigated by utilizing the cold-fasted state. Lipogenic inhibitory mechanisms, located primarily in the microsomes, appeared in the liver of the rat during the 24 hour fast at 0° to 2° C. Because the fatty acid-synthesizing enzymes are found to be present at nearly normal levels, and since the reduction in levels of coenzymes and stimulators of lipogenesis (such as "lipogenin") can account for only part of the depression in lipogenesis, it is evident that inhibitory mechanisms play a major role in restricting hepatic lipogenesis in the cold-fasted condition. The general role of inhibitory mechanisms in the homeostatic regulation of lipogenesis is discussed. (Author)

PB 160 341 $1.60

Naval Medical Research Inst., Bethesda, Md.
IN VIVO MEASUREMENT OF BODY FAT AND BODY WATER IN A GROUP OF NORMAL MEN, by Elliott F. Osserman, Walter C. Welham (Naval Gun Factory), and others. Vol. 12, p. 55-66. 10 Mar 54, 12p. 12 refs. Research rept. on Project NM 004 006.03.08.

DESCRIPTORS: Tissues (Biology), *Body fats, *Body fluids, Water, *Body weight, Density, Measurement, Analgesics.

Since fat is less dense than lean tissue, the proportion of fat in the body may be estimated by measuring the body specific gravity (sp. gr.), provided that the specific gravity of lean tissue remains constant. The water content of the lean body was studied in normal men, in order to determine whether it was constant. Using assumed values for the density of body fat and lean body tissue solids, the fat content of the body and the water content of the lean body mass could be calculated for each subject. Although the fat content varied from zero to 38.4 percent, the water content of the lean body mass was quite constant, 71.8 ± 2.9 percent (standard deviation). The results indicate that the concept of the constant composition of the lean body mass may be applicable to man.

PB 160 352 $1.60

Naval Medical Research Inst., Bethesda, Md.
INHIBITION IN THE EYE OF LIMULUS, by H. K. Hartline, F. Ratliff (Thomas C. Jenkins Labs. of Biophysics, Johns Hopkins U.), and H. G. Wagner. Vol. 14, p. 403-420. 22 May 56, 19p. 19 refs. Research rept. on Project NM 000 019.03.02.

DESCRIPTORS: *Eye, Visual perception, Inhibition, *Vision, Visual thresholds, Photoreceptors, Optic nerve, *Arachnids, *Compound eye.

(See also PB 140 653)

PB 160 691 $1.60

Vision Research Labs., U. of Michigan, Ann Arbor.
A NEURAL FORMULATION OF THE EFFECTS OF TARGET SIZE AND SHAPE UPON VISUAL DETECTION, by W. M. Kincaid, A. B. Kristofferson, and H. R. Blackwell. Rept. on Proj. Michigan, Contract DA 36-039-sc-52654. July 58, 17p. 8 refs. Rept. no. 2144-280-T; AD-200 891.

DESCRIPTORS: *Targets, Detection, *Target recognition, *Visual perception, Vision, Nerves, Optic nerve, Retina, Stimulation, Visual thresholds.

A quantitative formulation of the effects of target size and shape on visual detection is presented in connection with combat surveillance, the chief assumptions of which are that neural impulses originating in retinal receptors converge upon neurons in a central area, and that the excitation of the most excited neuron in that area determines the response. The relation of this hypothesis to earlier ideas along similar lines is discussed. It is shown that the hypothesis leads to testable relationships between thresholds for circular targets and for targets of other shapes. Evidence is presented that diffuse neural connections are relatively more important at low background levels, and an interpretation is suggested. (Author)

NYO-10326 $1.60

Boyce Thompson Inst. for Plant Research, Inc., Yonkers, N. Y.
BIOSYNTHESIS AND METABOLISM OF QUINIC ACID IN HIGHER PLANTS, by Leonard H. Weinstein and Clark A. Porter. Final rept. for the period ending 28 Feb 62, on Contract AT(30-1)-2413. 17 May 62, 11p. 13 refs.

NASA N62-13766 $5.60

Mississippi State U., State College.
BIOCHEMICAL STUDY OF MIXED CULTURE PROTOTYPE IN A CLOSED ECOLOGICAL SYSTEM, by R. G. Tischer. Progress rept., 1 June 60-31 May 61, on NASA Grant NsG-80-60. 6 July 61. 55p. refs.

PB 160 307 $1.60

Naval Medical Research Inst., Bethesda, Md.
A CALORIMETRIC DETERMINATION OF THE HEAT OF AN ANTIGEN-ANTIBODY REACTION, by R. F. Steiner, C. Kitginger, and T. H. Benzinger. Vol. 14, p. 73-86. 6 Feb 56, 15p. 17 refs. Research rept. on Project NM 000 018.06.45.

DESCRIPTORS: *Proteins, *Serium-albumin, *Antibodies, *Antigens, Calorimeters, Heat of reaction, *Enthalpy, Entropy.

The heat of combination of human serum albumin with rabbit antibody has been measured calorimetrically. Two different sets of controls were employed to eliminate errors arising from the nonspecific heat of mixing. A value of 3.6 ±1.0 kilocalories per bond was obtained, under the assumption that all antibodies were bivalent. When combined with existing measurements of the free energy, this enthalpy value results in a positive entropy of interaction. (Author)

PB 160 327 $1.10

Naval Medical Research Inst., Bethesda, Md.
CONVERSION OF STEROIDS TO ALDOSTERONE-LIKE MATERIAL, by Eugenia Rosemberg (Worcester Foundation for Experimental Biology), George Rosenfeld and others. Vol. 13, p. 907-912. 13 Dec 55, 7p. 7 refs. Research rept. on Project NM 006 012.04.90.

DESCRIPTORS: *Steroids, Synthesis, *Aldosterone, *Paper chromatography, Hormones, Metabolism, *Adrenal cortical extract, *Progesterone.

Progesterone caused a significant increment in the Na-retaining activity of the calf adrenal effluent, and corticosterone only a minor one. The DOC effluent showed even less aldosterone-like material than the control. Since both B and DOC were not effective precursors it would appear that 18-hydroxylation and/or the formation of 18-aldehyde from the 18-methyl group is more easily accomplished before 11β- and 21-hydroxylations have occurred. A tentative scheme for the possible metabolic pathways involved in the formation of aldosterone from progesterone is presented. (Author)

PB 160 292 $1.60

Naval Medical Research Inst., Bethesda, Md.
THE HEATS OF IONIZATION AND pK'_A's OF SOME BUFFERS OF BIOCHEMICAL INTEREST AT HIGH IONIC STRENGTH, by Sidney A. Bernhard. Vol. 12, p. 1011-1024. 22 Dec 55, 15p. 17 refs. Research rept. on Project NM 000 018.06.40.

DESCRIPTORS: *Ionization, *Buffers, *Enthalpy, Adenosine phosphates, Hydrolysis, *Heat of reaction, Muscles, Hydrogen ion concentration. *Body fluids.

The heats of ionization and pK'_A of $H_2PO_4^-$ and "tris" in 0.6 M KCL have been reported over the temperature range of 5° - 50° C. $\Delta H_{\text{"tris"}} = 11{,}700$ cal. mole^{-1}, and $\Delta H_{H_2PO_4^-} = 48{,}600 - 0.549\ T^2$, under these conditions. These values, together with previously reported pK'_A's and heats of ionization, are employed in the calculation of the heat liberated upon hydrolysis of ATP to ADP and orthophosphate. In the mammalian intrafibrial muscle fluid, under physiological conditions the total heat is calculated to be - 3,700 cal. mole^{-1}, in striking contrast to the usually quoted value of about - 12 kcal. mole^{-1}. Consideration of the effects of pK'_A's and heats of ionization of the physiological buffers must considerably alter previous concepts of the role of the "high energy" phosphate bond (~P) in ATP. (Author)

PB 160 335 $1.10

Naval Medical Research Inst., Bethesda, Md.
IF AN ENZYME-SUBSTRATE MODIFIER SYSTEM EXHIBITS NON-COMPETITIVE INTERACTION, THEN, IN GENERAL, ITS MICHAELIS CONSTANT IS AN EQUILIBRIUM CONSTANT, by M. F. Morales. Vol. 13, p. 207-212. 13 May 55, 6p. 7 refs. Research rept. on Project NM 000 018.11.02.

DESCRIPTORS: *Enzymes, Chemical reactions, Kinetic theory, Decomposition, *Dissociation, *Chemical equilibrium.

It is shown that analysis of the steady-state kinetics of a system consisting of an enzyme, a substrate, and a substance ("modifier") which by interaction via the enzyme can affect the rate of substrate decomposition, has the following useful consequence: If the modifier is either a non-competitive "activator" or non-competitive "inhabitor" then the Michaelis constant of the unmodified system is almost certainly the equilibrium constant for the dissociation of the enzyme-substrate complex. (Author)

PB 160 351 $1.60

Naval Medical Research Inst., Bethesda, Md.
THE INFLUENCE OF SPECIFIC CHEMICAL MODIFICATION UPON THE PHYSICAL AND IMMUNOCHEMICAL PROPERTIES OF PROTEINS. I: THE EFFECT OF GUANIDINATION UPON THE INTERACTION OF HUMAN SERUM ALBUMIN WITH RABBIT ANTIBODIES, by Robert F. Steiner. Vol. 13, p. 637-650. 15 Oct 55, 15p. 7 refs. Research rept. on Project NM 000 018.06.43.

DESCRIPTORS: *Proteins, *Serium-albumin, Guanidines, Lysines, *Immunology, *Antibodies, Precipitation, Centrifuge, peparation, Light transmission, Rabbits.

The combining properties of guanidinated human serum albumin with rabbit antibodies to normal human serum albumin have been studied by means of precipitin, ultracentrifugal, and light scattering techniques. It has been found that derivatives with up to 96 percent of the lysine groups converted to guanidinium groups retain to a considerable degree their antibody-combining properties. It follows that the lysine residues of serum albumin are, to a large extent, not involved in the interaction. (Author)

NASA N62-13298 $3.60

Resources Research, Inc., Washington, D. C. RADIOISOTOPIC BIOCHEMICAL PROBE FOR EXTRATERRESTRIAL LIFE, by Gilbert V. Levin, John R. Clendenning, and Mary F. Thompson. Quarterly progress rept. no. 2 on Contract NASr-10. 15 Aug 61. 38p.

NASA N62-13299 $4.60

Resources Research, Inc., Washington, D. C. RADIOISOTOPIC BIOCHEMICAL PROBE FOR EXTRATERRESTRIAL LIFE, by Gilbert V. Levin, Allen H. Heim and others. Quarterly progress rept. no. 3 on NASA Contract NASr-10. 15 Nov 61, 42p. 5 refs.

PB 160 303 $2.60

Naval Medical Research Inst., Bethesda, Md. THE USE OF THE FLUORESCENCE TECHNIQUE AS AN ABSOLUTE METHOD FOR OBTAINING MEAN RELAXATION TIMES OF GLOBULAR PROTEINS, by R. F. Steiner and A. J. McAlister. Vol. 4, p. 955-978. 17 Dec 56, 25p. 16 refs. Research rept. on Project NM 000 018.06.54; AD-132 821.

DESCRIPTORS: *Fluorescence, Fluorescent dyes, *Proteins, Lysozyme, Albumins, Molecular structure, *Relaxation time, *Polarographic analysis.

The capability of the fluorescence polarization technique to obtain self-consistent relaxation times for globular proteins is examined. The proteins lysozyme, egg albumin, and bovine serum albumin which were studied provided a range of molecular weights from 14,000 to 65,000. The proteins were conjugated with 3 different fluorescent residues: fluorescein isocyanate, 1-dimethylaminonaphthalene-5-sulfonyl chloride, and anthracene 2-sulfonyl chloride; these residues provided a nearly 3:1 range of excited lifetimes. Measurements of excited lifetime and degree of polarization were combined to yield values for the mean relaxation time of fluorescent conjugates of the proteins. Evidence is presented for the validity of relaxation times thus computed and for the absence of contributions from non-randomness of fluorescent residue orientation and from internal degrees of rotational freedom.

Microbiology

NASA N62-13267 $1.10

National Research Corp., Cambridge, Mass. EFFECTS OF SIMULATED SPACE ENVIRONMENT ON THE VIABILITY OF MICRO-ORGANISMS, by Gerald Silverman. Quarterly status rept. no. 3, 15 Oct 61-15 Jan 62, on Contract NASr-41. 8 Jan 62, 8p.

PB 160 321 $1.10

Naval Medical Research Inst., Bethesda, Md. COMPARATIVE TESTS OF DRIED PEPTONE AND PANCREATIC DIGEST OF CASEIN FOR CERTAIN BACTERIOLOGICAL PURPOSES, by Frank Davis, Laverne A. Barnes, and Edward P. Sweeney. 28 Feb 51, 9p. 3 refs. Rept. on Project NM 005 048.13.01.

DESCRIPTORS: *Peptones, *Pancreas, Secretion, Casein, *Culture media, Growth, *Escherichia, *Shigella, *Salmonella.

A comparative study of three different lots of peptones and three of pancreatic digests of casein in MR - VP and 2 per cent peptone media was made. Growth, H_2S and indol production, pH and morphology of Salmonella anatum, Shigella flexneri III, and Escherichia coli were followed in each of these media. Total nitrogen and reducing carbohydrate contents of each protein product were also determined. For greater growth and rapid H_2S production by S. anatum and E. coli, the peptones are indicated. For increased growth of S. flexneri III, an available carbohydrate source was also required. All products were equivalently effective for indol production by S. flexneri III, but only the 2 per cent peptone solution was effective for positive indol by E. coli. No significant lot difference was observed. The data showed that the tested products should not be considered as adequate mutual substitutes and therefore both items should be retained in the supply catalog and also be available to all branches of the service. (Author)

PB 160 325 $2.60

Naval Medical Research Inst., Bethesda, Md. THE CONSTRUCTION AND ANALYSIS OF A METAL EVAPORATOR FOR USE WITH THE ELECTRON MICROSCOPE, by Myles Maxfield and C. Levich. Rept. no. 2 on Project NM 000 002. 9 Aug 47, 22p. 8 refs.

DESCRIPTORS: *Evaporators, Metal films, *Gold, *Electron microscopy, Image intensifiers, *Medical equipment, *Laboratory equipment

Applying the principles set forth by Williams and Wyckoff a metal evaporator has been constructed to evaporate gold and other suitable substances to aid in the preparation of electron microscope specimens. Analysis of the operation of the metal evaporator showed that a vacuum of less than 0.2 micron of Hg. pressure can be obtained in 44 minutes. Gold evaporated for one minute at 1700° C, at a distance of 10 cm. from the specimen, produces a film of satisfactory thickness (about 16 A.). Electron photomicrographs of Leptospira icterohaemorrhagiae showed increased contrast, visibility, detail, and image area.

The height of a projection on the specimen is indicated precisely by the length of its shadow. A single disadvantage of shadowed microscope specimens is apparent, namely obscuring of internal detail of the organism by the surface film. (Author)

PB 160 347 $1.10

Naval Medical Research Inst., Bethesda, Md.
INFECTIVITY OF RICKETTSIA TSUTSUGAMUSHI-INFECTED YOLK SAC SUSPENSION AFTER STORAGE FOR VARYING TIME INTERVALS, by James E. Proffitt. Vol. 12, p. 411-420. 22 Oct 54, 10p. 3 refs. Research rept. on Project NM 005 002, rept. no. 10.

DESCRIPTORS: *Bacteria, *Rickettsia, Culture media, Storage, Viability, Infections.

The belief that suspensions of Rickettsia tsutsugamushi would rapidly lose their infectivity when stored in a refrigerator or at room temperature has been shown by experiments not to be true. High titer suspensions will retain satisfactory titers for at least one day. Such storage results in a progressive decrease in fatality rate and increase in survival time of injected mice. Dilution of the infected yolk sac suspensions produces similar changes. Refrigerator conditions seem to favor preservation of the more dilute suspensions but have little effect on the more concentrated mixtures when compared with the same dilutions at room temperature. (Author)

PB 160 354 $1.60

Naval Medical Research Inst., Bethesda, Md.
INJURY AND RECOVERY OF SPIROGYRA EXPOSED TO ULTRASOUND, by D. E. Goldman and W. W. Lepeschkin. Vol. 14, p. 851-868. 1 Nov 56, 17p. 6 refs. Research rept. on Project NM 004 005.03.09.

DESCRIPTORS: *Plants, *Algae, Cells (Biology), Injuries, Recovery, *Ultrasonic properties, *Ethyl ethers.

The time sequence of morphological changes in Spirogyra filaments during exposure to ultrasound at 400 and 700 kc. shows a definite pattern. Injury to the cells increases to a maximum at 5 to 15 minutes, and is followed by a partial recovery which is maintained for an hour, provided that the ultrasound is of moderate intensity. Intense ultrasound produces a rapid progressive injury and death of cells with no maximum in the injury-time curve. Temperature changes and small concentrations of ethyl ether affect the injury-recovery processes. The behavior of the system is fairly well described by a rather simple, non-linear differential equation. (Author)

PB 160 300 $1.10

Naval Medical Research Inst., Bethesda, Md.
USE OF SENSITIVITY DISKS TO DETERMINE SUSCEPTIBILITY OF SOME GRAM NEGATIVE ORGANISMS TO ANTIBIOTICS, by Edward P. Sweeney, Frank Davis, and Laverne A. Barnes. 12 Mar 51, 8p. 3 refs. Research rept. on Project NM 005 048.04.13.

DESCRIPTORS: *Bacteria, Intestinal bacteria, Shigella, Sensitivity, Test methods, Drugs, *Antibiotics, Chloromycetin, Terramycin, Streptomycin, Penicillin.

By the use of a rapid disk sensitivity test, it was found that ten strains of Shigella were most susceptible to Chloromycetin, somewhat less to Terramycin, and showed negative to moderate susceptibility to Dihydrostreptomycin, Penicillin, and Bacitracin. A strain of Proteus morganii was equivalently susceptible to both Chloromycetin and Terramycin, moderately susceptible to Dihydrostreptomycin, and completely resistant to Bacitracin and Penicillin. (Author)

TID-15000 $3.60

Syracuse U., N. Y.
PRODUCTION AND STUDY OF ASPOROGENIC MUTANTS OF BACILLUS CEREUS, by Donald G. Lundgren. Annual rept. 1 June 61-31 May 62, on Contract AT(30-1)-2038. 14 Feb 62, 39p. 27 refs.

Pathology

PB 160 308 $1.10

Naval Medical Research Inst., Bethesda, Md.
CHANGES IN HOST-CELL PREFERENCES IN MALARIAL PARASITES AND THEIR RELATION TO SPLENIC RETICULAR CELLS, by Clay G. Huff. Vol. 11, p. 987-992. 13 Aug 53, 7p. 9 refs. Research rept. on Project NM 005 048.01.06.

DESCRIPTORS: *Malaria, Parasites, *Plasmodium, Reticulo-endothelial system, *Spleen, Cells (Biology), Birds.

It is known that during the course of sporozoite-induced infections of various avian malarias certain changes occur in the types of host cells infected. This study is devoted to the patterns of behavior of the parasites in infections induced by sporozoites and in other infections induced by the inoculation of erythrocytic stages.

PB 160 322 $2.60

Naval Medical Research Inst., Bethesda, Md.
COMPOSITION AND EFFECT OF VAPORS EMANATING FROM INSULATED ELECTRICAL EQUIPMENT UNDER CONDITIONS OF SIMULATED SUBMARINE OPERATION, by Julius Sendroy, Jr., John D. O'Neal, and Grover C. Pitts. 8 Aug 50, 24p. 26 refs. Rept. on Project NM 004 005.02.01.

DESCRIPTORS: Electrical equipment, Insulating materials, Electric insulation, *Submarines, Operation, Simulation, *Vapors, *Carbon compounds, *Monoxides, Gases, Chemical analysis, *Toxicity, *Poisonous gases, Electric motors.

Evaluation of motor performances, from the standpoint of medical acceptability, is made: (a) At insulation temperatures in excess of 150°C. maintained for periods of 96 hours, CO is produced by "Harvel" in

insulated motors, in concentrations injurious to health. (b) Insulation temperatures in excess of 250°C. maintained under similar conditions of operation for Teflon insulated motors do not constitute a health hazard in respect to CO production. However, the possibility of injury from fluorine-containing gases, especially at 250°C., or above, is not ruled out by these tests, and no final or unequivocal conclusion as to the medical acceptability of this equipment operating under these conditions, is possible at this time.

PB 160 333 $1.10

Naval Medical Research Inst., Bethesda, Md.
THE CYCLIC TRANSMISSION OF JAPANESE ENCEPHALITIS BY CULEX QUINQUEFASCIATUS, UTILIZING YOUNG ALBINO MICE, by Herbert S. Hurlbut and John I. Thomas. Rept. no. 6 on Project NM 005 007. 5 Oct 48, 9p. 2 refs.

DESCRIPTORS: *Encephalitis, *Mosquitoes, Transmission, *Disease carriers, Virus infections, Mice

The results indicate that C. quinquefasciatus can be readily infected with the virus of Japanese encephalitis by biting young albino mice in the early stages of the disease and that these mosquitoes are capable of transmitting the infection thus acquired. The blood of mice in the later stages of the disease appears to be less infective. However, one mouse which was infective after a 48-hour incubation period was also infective about two days later, a few hours before it died of the disease.

PB 160 258 $2.60

Naval Medical Research Inst., Bethesda, Md.
EXPERIMENTAL INFECTIONS WITH PLASMODIUM FALLAX SCHWETZ ISOLATED FROM THE UGANDA TUFTED GUINEA FOWL, NUMIDA MELEAGRIS MAJOR HARTLAUB, by Clay G. Huff, Dorothy F. Marchbank and others. Rept. on Project NM 005 048.01.02. 27 Nov 50, 24p. 7 refs.

DESCRIPTORS: *Malaria, *Parasitic infections, *Birds, *Disease carriers, *Plasmodium

A description is given of experiments upon a species of malaria parasite, believed to be identical with P. fallax, isolated from an African guinea fowl from the Anglo-Egyptian Sudan. Its course of infection in pigeons, its vectors, and its pre-erythrocytic stages are here described.

PB 160 256 $1.60

Naval Medical Research Inst., Bethesda, Md.
EVALUATION OF A PANTOTHENIC ACID ANALOGUE (SN 14,622) AS A POSSIBLE ANTISTREPTOCOCCAL AGENT, by Cary O. Edge, L. A. Barnes, and Roger C. Durant. Rept. no. 2 on Project NM 005 009 X-754. 23 Mar 48, 13p. 6 refs.

DESCRIPTORS: *Drugs, *Streptococcus infections, Therapy, Effectiveness, *Vitamins.

Tests were conducted to evaluate the antistreptococcal properties of SN 14,622 in white mice infected with Group A beta hemolytic streptococci in: (a) single intraperitoneal doses of 1.5 mg., (b) repeated intraperitoneal doses of 1.5 mg. totaling 9.0 mg., (c) single oral doses of 20 mg. It was observed that in none of the tests did the survival rate among the treated mice exceed that of the control groups. This drug, therefore, under the conditions employed, displayed no beneficial effect in mice infected with Group A beta hemolytic streptococci. (Author)

PB 160 265 $1.60

Naval Medical Research Inst., Bethesda, Md.
FACTORS INFLUENCING HOST VIRUS INTERACTIONS. A COMPARISON OF VIRAL MULTIPLICATION AND HISTOPATHOLOGY IN INFANT, ADULT, AND CORTISONE-TREATED ADULT MICE INFECTED WITH THE CONN.-5 STRAIN OF COXSACKIE VIRUS, by William D. Boring and D. Murray Angevine (Wisconsin U. School of Medicine) and Duard L. Walker Vol. 13, p. 707-722. 17 Oct 55, 17p. 33 refs. Research rept. on Project NM 005 048.23.01.

DESCRIPTORS: *Virus diseases, Immunization, *Age, Pathology, *Adrenal cortical extract, Cells (Biology), Tissues (Biology), Mice

In a study of factors influencing the course of viral infections, it was found that following infection with the Conn.-5 strain of Coxsackie virus in 4-5 day old infant mice, adult mice, and adult mice treated with cortisone, there was prompt and widespread dissemination of the virus via the blood in all groups. Even though infecting virus appeared initially equally distributed to cells and tissues of all groups, subsequent viral multiplication and cellular injury occurred in many organs in infant mice but were almost totally limited to the pancreas in adults. Treatment of adult mice with a single injection of cortisone resulted in viral multiplication and tissue damage in several sites in addition to the pancreas, the most marked occurring in the liver and heart. Interpretation of this data and other available information leads to the conclusion that these differences in pathogenesis are not explainable solely by differences in specific immune response, and it is suggested that developmental changes in cells and tissues, related to cellular metabolism and alterable by cortisone, are important factors in determining the course of this infection in mice. (Author)

PB 160 266 $1.10

Naval Medical Research Inst., Bethesda, Md.
FACTORS INFLUENCING HOST-VIRUS INTERACTIONS. THE INFLUENCE OF A COLD ENVIRONMENT ON COXSACKIE VIRUS INFECTION IN ADULT MICE, by William D. Boring, Gabriele M. Zu Rhein (Wisconsin U. Medical School), and Duard L. Walker. Vol. 14, p. 691-698. 8 Oct 56, 9p. 10 refs. Research rept. on Project NM 005 048.23.02.

DESCRIPTORS: *Virus diseases, Immunization, Pathology, Pancreas, Liver, Temperature, Mice.

In a study of factors influencing the course of viral infections it was found that although adult mice possessed a natural resistance to the Conn. 5 strain of Coxsackie virus such that the disease was limited to a nonfatal infection of the pancreas, this refractoriness was lost

when the animals were maintained in a cold environment (4° C.) and a lethal infection resulted which was charterized by a persisting viremia, high levels of virus in the liver, and lesions demonstrable in other organs as well as in the pancreas. This fatal outcome could be prevented by neutralization of the virus or passive immunization of adult mice with specific antiserum. The quantity of virus necessary to produce a lethal infection in adult mice at 4° C. was found to be approximately 10 times that necessary to cause a fatal infection in infant mice at 25° C. It was found that to initate a fatal infection in adult mice exposure to cold had to be continuous and begun within a few days after virus inoculation. (Author) (See also PB 160 265)

PB 160 272 $2.60

Naval Medical Research Inst., Bethesda, Md.
FIELD TRIAL OF SHIGELLA FLEXNERI III VACCINE. IV. PRELIMINARY REPORT OF CULTURAL RESULTS, by L. A. Barnes and R. C. Durant. Rept. no. 8 on Project NM 005 010 (X-756). 23 Aug 49, 21p. 7 refs.

DESCRIPTORS: *Shigella vaccine, Shigella infections, Inhibition, *Disease carriers, Immunization.

Of critical significance was the fact that from 92 individuals, or 2.45% of those included in the program, S. flexneri III was recovered at least once; over 85% of this group had been present in epidemics presumably due to this organism several months prior to initiation of the program. Six cases of typical, acute shigellosis due to S. flexneri III appeared during the studies. In none of the six individuals who was considered as recently established asymptomatic carriers or the six sporadic cases of illness was there evidence of failure of the parenterally administered Shigella vaccine to prevent infection. Possible relationship between the immunization procedures employed and the absence of an epidemic during the program was discussed briefly.

PB 160 273 $1.10

Naval Medical Research Inst., Bethesda, Md.
FIELD TRIAL OF SHIGELLA FLEXNERI III VACCINE. V. FINAL REPORT OF CULTURAL RESULTS, by L. A. Barnes, A. B. Smith and others. 4 Apr 50, 9p. 2 refs. Rept. on Project NM 005 048.04.10, formerly NM 005 010.

DESCRIPTORS: *Shigella vaccine, Shigella infections *Disease carriers, *Immunization.

From 2,144 officers and men on the two ships, a total of 43,014 rectal swab cultures was studied of these, 101 strains of Shigella and Salmonella types were isolated from 48 asymptomatic subjects S. flexneri III was recovered at least once from 11 individuals, eight of whom had been present in a previous epidemic, and three were ill at the time of the outbreak. The addition of these 11 men to the previously reported figure of 92 makes a total of 103 asymptomatic carriers of S. flexneri III detected aboard the five ships in the program. The probable sources of infection acquired by three of the carriers who denied presence in a previous eqidemic and the possible relationship of the kinds of vaccine administered to them were discussed briefly.

PB 160 274 $1.60

Naval Medical Research Inst., Bethesda, Md.
FIELD TRIAL OF SHIGELLA FLEXNERI III VACCINE. VI. SERUM MOUSE PROTECTIVE STUDIES, by L. A. Barnes, M. L. Cooper (Children's Hospital Research Foundation), and others. 10 Nov 50, 19p. 13 refs. Rept. on Project NM 005 048.04.11, formerly NM 005 010.

DESCRIPTORS: *Shigella vaccine, Serum, Mice, *Immunization, Effectiveness.

It appeared that the parenterally administered S. flexneri III vaccine induced the production of protective antibody in susceptible personnel to a degree comparable with that found in men who had experienced a natural infection; records suggest that individuals who have convalesced from the disease rarely suffer second attacks due to the same Shigella type.

PB 160 275 $1.60

Naval Medical Research Inst., Bethesda, Md.
FIELD TRIAL OF SHIGELLA FLEXNERI III VACCINE. VII. STUDIES ON ASYMPTOMATIC CARRIERS OF THE ORGANISM, by L. A. Barnes. 14 Feb 51, 19p. 11 refs. Rept. on Project NM 005 048.04.12, formerly NM 005 010.

DESCRIPTORS: Shigella infections, *Shigella vaccine, *Disease carriers, Identification, Medical examination, Intestinal bacteria, Therapy, *Chloromycetin.

From a group of 24 men who had harbored S. flexneri III over a year prior to the current studies, 18 were found to be no longer carriers. The duration of infection in the latter group was estimated to have been between 0 and 36 months. During a preliminary series of 60 successive rectal swab cultures 6 of the 24 men were found still to be excreting the organisms. The duration of infection in this smaller group was found to vary between 20 and 56 months. Attempts to locate foci of infection were unsuccessful. A course of chloramphenicol consisting of 250 mg. every three hours around the clock to a total of 15 gm. was administered to each carrier after completion of the clinical observations. (See also PB 160 274)

PB 160 276 $1.10

Naval Medical Research Inst., Bethesda, Md.
FIELD TRIALS OF SHIGELLA FLEXNERI 3 VACCINE, VIII. OBSERVED AND REPORTED REACTIONS TO THE VACCINE, by L. A. Barnes. Vol. 13, p. 629-636. 13 Sep 55, 9p. 8 refs. Research rept. on Project NM 005 048.04.22.

DESCRIPTORS: *Shigella vaccine, Typhus vaccine, Immunization.

Data collected during a field trial of S. flexneri 3 vaccine in 1948-49 were analyzed with respect to the occurrence of local and systemic reactions subsequent to inoculations of the material and of S. typhi vaccine used as a placebo. The incidence of some reaction to one or the other type of vaccine in a study population of 3,204 officers and men was 54.6 percent; there was no statistically reliable difference between the incidences

of reactions following administration of the two preparations. No severe reactions were encountered. Only two individuals experienced moderate reactions that resulted in admission of the men to the sick list for a maximum of 24 hours. Local reactions at the sites of injection were by far the most frequent complaints. There was a significantly higher incidence of reactions to both vaccines among individuals who were 24 years of age or older than in personnel below that age. A history of relatively recent attacks of acute shigellosis has no effect on the incidence of reactions except in those who received S. typhi vaccine; the fact that this group contained a disproportionately large number of men above 24 years of age offered a satisfactory explanation for the discrepancy. (Author) (See also PB 160 275)

PB 160 277 $1.10

Naval Medical Research Inst., Bethesda, Md. FILARIASIS IN AMERICAN SAMOA. I. LOSS OF MICROFILARIA IN THE ABSENCE OF CONTINUED REINFECTION, by Leo A. Jachowski, Jr., Gilbert F. Otto, and James D. Wharton. 1 Dec 50, 9p. Rept. on Project NM 005 048.08.01.

DESCRIPTORS: *Filariasis, *Hawaii, *Parasitic infections, Mosquitoes, *Disease carriers, Control, Ecology, Geography, Epidemiology, Polynesia. *Wuchereria

Surveys in 1950 to determine the incidence of microfilaremia in Samoans included a group of nurses having 4 to 52 months residence at the Samoan Hospital. Antimosquito measures have made transmission of Wuchereria bancrofti in the vicinity of this hospital highly improbable. Consequently, the nurses probably are not reinfected during their period of training. The incidence of microfilaremia in nurses with residence at the hospital for as long as 32 months corresponded to that observed in women of the same age group in various villages. However, the number of nurses with residency of 40 to 52 months with microfilariae was considerably lower than expected. Extending these studies, a group of 134 Samoans living on Oahu, Hawaii were examined for microfilariae. None of 62 Samoans who were born and reared in Hawaii showed any blood infection. It appears that microfilaremia may persist for at least five years in persons who are not exposed to reinfection. However, it would appear that the microfilariae disappear within ten years after the last infection. (Author)

PB 160 278 $2.60

Naval Medical Research Inst., Bethesda, Md. FILARIASIS IN AMERICAN SAMOA. III. STUDIES ON CHEMOTHERAPY AGAINST THE NONPERIODIC FORM OF WUCHERERIA BANCROFTI, by G. F. Otto (Johns Hopkins U. School of Hygiene and Public Health) L. A. Jachowski, and J. D. Wharton. Vol. 11, p. 827-850. 16 July 53, 25p. 16 refs. Research rept. on Project NM 005 048.08.03.

DESCRIPTORS: *Filariasis, *Chemotherapeutic agents, *Parasitic infections, Public health, Polynesia, *Amides, Sodium compounds, Ethyl radicals, *Wuchereria.

Two therapeutic agents, diethylcarbamazine and sodium thiacetarsamide were tested against the nonperiodic form of Wuchereria bancrofti in American Samoa. Five groups of infected individuals were given diethylcarbamazine per os on varying schedules. In all groups there was an initial dramatic reduction in the numbers of microfilariae in the peripheral blood. Accompanying this reduction, patients with high microfilaremias prior to treatment experienced protein shock reactions. Those with low microfilaremias had no reaction. Although diethylcarbamazine is rapidly microfilaricidal, at least in its initial doses, the possible effect upon the adult worms is not clearly elucidated. Sodium thiacetarsamide was given intravenously to a single group of 15 individuals. The role of these antifilarial drugs as an adjuvant public health measure in the control of nonperiodic filariasis has yet to be demonstrated. Diethylcarbamazine is microfilaricidal, but too temporary in its action, and thiacetarsamide, while more lasting, has limited value because it must be given intravenously daily for not less than 15 days. (Author) (See also PB 160 277)

PB 160 279 $7.60

Naval Medical Research Inst., Bethesda, Md. FILARIASIS IN AMERICAN SAMOA. IV. STUDIES ON THE FACTORS INFLUENCING THE EPIDEMIOLOGY OF THE INFECTION, by Leo A. Jachowski, Jr. and Gilbert F. Otto (Johns Hopkins U. School of Hygiene and Public Health). Vol. 11, p. 869-940. 26 Aug 53, 71p. 52 refs. Research rept. on Project NM 005 048.08.04.

DESCRIPTORS: *Filariasis, Parasitic infections, *Mosquitoes, Ecology, Epidemiology, Polynesia.

Emphasis by earlier workers of the villages as the foci of transmission of nonperiodic filariasis seems to have been based upon misinterpretations of their data. The concept of domestic transmission of this parasite appears to have no foundation in fact. Domestic transmission cannot occur in open villages for there are no Aedes pseudoscutellaris in such areas. The significantly lower microfilaria rates in women and children, who spend most of their time in such villages support this premise. The cases which do occur may be explained by the activities of the infected individuals outside of the villages. Transmission in bush villages is not truly domestic for it only reflects an extension of man's home into the mosquito's habitat. It certainly does not represent the domestic transmission of the periodic form of W. bancrofti by Culex fatigans. The available data support the concept of diffuse foci of filarial transmission in a wild ecological niche rather than in the domestic environment. (See also PB 160 278)

PB 160 280 $2.60

Naval Medical Research Inst., Bethesda, Md. FILARIASIS IN AMERICAN SAMOA. V. BIONOMICS OF THE PRINCIPAL VECTOR, AEDES POLYNESIENSIS MARKS, by Leo A. Jachowski, Jr. Vol. 13, p. 129-152. 10 Feb 55, 24p. 20 refs. Research rept. on Project NM 005 048.08.05.

DESCRIPTORS: *Filariasis, *Disease carriers, *Mosquitoes, Parasitology, Ecology, Polynesia.

Field data collected in American Samoa from 1948 through 1950 provided information on the distribution, habitat, activity, abundance, and reproduction of A. polynesiensis. Supplementary laboratory studies at The Johns Hopkins University produced additional information on survival and feeding of adults and on the development of immature stages of this mosquito.

PB 160 281 $1.10

Naval Medical Research Inst., Bethesda, Md. FILARIASIS IN AMERICAN SAMOA. VI. SURVEY OF SWAIN'S ISLAND, by Leo A. Jachowski. Vol. 13, p. 723-728. 7p. 4 refs. Research rept. on Project NM 005 048.08.06.

DESCRIPTORS: *Filariasis, *Disease carriers, *Mosquitoes, Control, Sanitary engineering, Parasitology, Polynesia, *Wuchereria

Non-periodic Wuchereria bancrofti is endemic on Swain's Island, an isolated atoll in American Samoa. Microfilariae were found in 15 (13.6 percent) of the 110 persons examined. One case of elephantiasis of the legs was observed. Aedes polynesiensis appears to be the vector for larval filariae were found in 3 of 105 mosquitoes dissected. Burial of coconut waste to prevent mosquito breeding and use of antifilarial drugs are suggested control procedures. (Author) (See also PB 160 280)

PB 160 284 $1.10

Naval Medical Research Inst., Bethesda, Md. THE FREQUENCY OF BISEXUAL INFECTIONS OF SCHISTOSOMA MANSONI IN SNAILS OF THE SPECIES AUSTRALORBIS GLABRATUS (Say), by M.A. Stirewalt and W. J. Bullock. 8 June 50, 10p. 10 refs. Rept. on Project NM 005 048.02.24.

DESCRIPTORS: *Schistosma, Parasitic infections, *Sex, Disease carriers, Growth, Snails.

The proportion of bisexual infections among susceptible snails, indicating the maturation of at least one miracidium of each sex per snail, was lower than that to be expected on the basis of an "attraction" of the molluscs for the miracidia and the uninhibited development of the latter after penetration. It is suggested that perhaps the contact of these miracidia with the sofe tissues of the snail is a chance phenomenon.

PB 160 295 $2.60

Naval Medical Research Inst., Bethesda, Md. A HIGH-SPEED, RECORDING GRADIENT THERMAL FLOWMETER FOR STUDIES OF LOCAL THERMAL INJURY AND SUPERFICIAL CIRCULATION, by Elliott F. Osserman and David Minard. Vol. 11, p. 1191-1218. 17 Nov 53, 29p. 12 refs. Research rept. on Project NM 007 081.03.05.

DESCRIPTORS: *Flowmeters, *Skin, *Blood circulation, *Burns, Body temperature, Injuries, *Medical equipment.

A recording, gradient layer thermal flowmeter has been developed for the study of experimental contact burns and superficial circulation. From the record of the gradient potential during the burning period, the total caloric input to the area can be calculated. At temperatures below the threshold for thermal injury, the unit has been employed for the study of certain of the physical determinants of heat flow to human skin. The initial transient of heat flow can be described in terms of two exponential rate processes. A steady state of thermal equilibrium follows this initial transient. This "equilibrium heat flow" is principally a function of the effective bloodflow through the area. Small rhythmic fluctuations (2-3/min.) in equilibrium heat flow to the hand reflect spontaneous rhythmic vasomotion. Observations on the exteriorized rabbit kidney have shown that vasoconstriction of the superficial cortical blood vessels produced by epinephrine or asphyxia, results in a pronounced decrease in equilibrium heat flow. Because the thermal gradient layer will record heat flow in either direction, i.e., either into or out of the test site, it is suggested that by circulation of a coolant through the unit, useful information might be obtained concerning the requisite amount of heat to be withdrawn from the tissues, necessary to produce local cold injury.

PB 160 342 $1.10

Naval Medical Research Inst., Bethesda, Md. INABILITY OF MOSQUITOES TO TRANSMIT THE LANSING STRAIN OF POLIOMYELITIS VIRUS TO MICE, by Herbert S. Hurlbut. Rept. no. 3 on Project NM 005 007. 2 Feb 48, 9p. 8 refs.

DESCRIPTORS: *Mosquitoes, *Disease carriers, Transmission, *Poliomyelitis virus, Mice

PB 160 344 $1.10

Naval Medical Research Inst., Bethesda, Md. INDUCED RESISTANCE IN MICE TO THE INTRAVENOUS TOXICITY OF INFLUENZA VIRUS, by Duard L. Walker and Newton Khoobyarian. Doctoral thesis (Wisconsin U. Medical School). Vol. 14, p. 699-706. 8 Oct 56, 9p. 10 refs. Research rept. on Project NM 005 048.23.03.

DESCRIPTORS: Viruses, *Influenza viruses, Toxicity, *Immunology, Acquired immunity, Enzymes, Mice.

A preparation of receptor destroying enzyme (RDE) was effective in inducing increased resistance but its effects could not be attributed to its capacity for destruction of cellular mucoprotein receptors since heat destruction of this activity did not completely destroy the resistance inducing effect. It appears that this increased resistance seen after intravenous injections of sublethal quantities of virus in mice cannot be attributed to specific antibody production. Its mechanism remains uncertain but it is suggested that it may be related to the "virus interference phenomenon" usually associated with actively multiplying virus in susceptible cells. (Author)

PB 160 349 $1.60

Naval Medical Research Inst., Bethesda, Md. THE INFLUENCE OF PREVIOUS INFECTION OF MICE WITH SCHISTOSOMA MANSONI ON A CHALLENGING INFECTION WITH THE HOMOLOGOUS PARASITE, by M. A. Stirewalt. Vol. 11, p. 33-48. 12 Jan 53, 17p. 10 refs. Research rept. on Project NM 005 048.02.29.

DESCRIPTORS: *Parasitic infections *Immunization, *Schistosomiasis, Inhibition.

Female albino mice were re-exposed to cercariae of Schistosoma mansoni at intervals of one hour, five hours, one day, two days, one week, one month, and two months after an original infection, together with previously unexposed control mice. All exposures were through tail skin. For all except the longest inter-exposure interval the parasites of the initial and challenging infections were tagged by their sex. The percentage of schistosomes maturing from the challenging exposure in the superinfected mice was significantly reduced below that in the control mice when the inter-exposure interval was one hour, five hours, one day, and two months, but not when it was two days, one week, or one month. This reduction was found to be the result of the inhibition of penetration by the cercariae of the challenging exposure when the second exposure followed the first by an interval of one hour, five hours, and one day, each exposure being to cercariae of only one sex. When the inter-exposure period was longer than one day, no significant cercarial inhibition was noted. The adult schistosome burden in the superinfected mice with an interval of two months between exposures must, therefore, have been reduced by immune mechanisms acting on the parasites after they have successfully invaded the mice. The mechanism of inhibition of penetration of cercariae of the challenging exposure is unknown. (Author)

PB 160 356 $1.60

Naval Medical Research Inst., Bethesda, Md.
AN INTERACTION OF BACTERIAL PYROGEN WITH BLOOD, PLASMA, AND SERUM, by Richard S. Farr, Sam L. Clark, Jr., and James E. Proffitt. Vol. 11, p. 941-958. 14 Aug 53, 18p. 12 refs. Research rept. on Project NM 007 081.12.01.

DESCRIPTORS: Bacteria, Escherichia, Pseudomonas, Salmonella, Immunology, *Bacterial vaccines, *Pyrogens, *Blood, Blood plasma, *Serum, Physiology

The fever response of normal and tolerant rabbits to typhoid vaccine and certain other bacterial pyrogens may be enhanced by the in vitro incubation of the pyrogen with normal homogenous whole blood, plasma, or serum. Autogenous plasma, human plasma and serum, and guinea pig serum, will also produce the enhancing effect. Evidence is discussed which indicates that normal, as well as tolerant rabbits, possess defense mechanisms against the fever-producing effects of pyrogens. Furthermore the qualitative similarity of response of normal and tolerant rabbits to varying doses of pyrogen suggests that tolerance to pyrogens may represent merely a quantitative exaggeration of defense mechanisms already present in normal rabbits.

PB 160 298 $1.10

Naval Medical Research Inst., Bethesda, Md.
AN UNSUCCESSFUL ATTEMPT TO PROTECT MICE AGAINST SCHISTOSOMA MANSONI BY TRANSFER OF IMMUNE RAT SERUM, by M. A. Stirewalt and A. S. Evans. Vol. 10, p. 441-448. 29 July 52, 8p. 11 refs. Research rept. on Project NM 005 048.02.28.

DESCRIPTORS: *Schistosomiasis, Parasitic infections, Antibodies, *Immunization, Serum.

Albino mice receiving a series of seven subcutaneous injections of 0.3 ml of serum from heavily infected albino rats, were exposed to 100 cercariae of Schistosoma mansoni per mouse immediately after, just prior to, and four weeks before the series of injections. No evidence was found in the mice of the transfer of immunity by this means. (Author)

Radiobiology

UCLA-504 $1.60

California U., Los Angeles, School of Medicine.
A RAPID METHOD FOR DETERMINING TRITIUM WATER IN URINE FOLLOWING ACUTE EXPOSURE, by L. S. Meyers, Jr. and Cynthia Rosenblum. Rept. on Contract AT(04-1)-GEN-12. May 62, 13p. 11 refs.

HW-SA-2544 $3.60

Hanford Atomic Products Operation, Richland, Wash.
AUTORADIOGRAPHY OF TISSUE, by N. L. Dockum. Rept. on Contract AT(45-1)-1350. 9 May 62, 34p. 19 refs.

TID-14420 $3.60

Hawaii Marine Lab., U. of Hawaii, Honolulu.
THE ACCUMULATION OF RADIOACTIVE ISOTOPES BY TROPICAL MARINE ORGANISMS, by Sidney J. Townsley, Della F. Reid, and Winifred T. Ego. Annual rept. 1960-1961, on Contract AT(04-3)-245. 36p. 41 refs.

TID-16026 $1.60

Institute for Cancer Research, Philadelphia, Pa.
MODIFICATION OF GENETIC DAMAGE PRODUCED BY IONIZING RADIATION. Annual progress rept. on Contract AT(30-1)-2618. 14 June 62, 12p.

TID-15021 $1.10

Michigan State U., East Lansing.
BASIC FERTILIZATION PHENOMENA AND GAMETIC LETHALITY IN DROSOPHILA. Technical progresss rept. on Contract AT(11-1)-1033. 4p. 4 refs.

TID-15385 $4.60

Michigan State U., East Lansing.
A STUDY OF PRODUCTIVITY IN A STREAM ECOSYSTEM, by Robert C. Ball and Frank F. Hooper. Progress rept. 14 June 61-7 Mar 62, on Contract AT(11-1)-655. Mar 62, 47p. 16 refs.

PB 160 313 $1.60

Naval Medical Research Inst., Bethesda, Md. CHOLINESTERASE ACTIVITY, WEIGHT, WATER CONTENT AND PATHOLOGY OF SMALL INTESTINE OF RATS SUBJECTED TO X-RADIATION, by R. A. Conard. Vol. 10, p. 471-482. 29 Aug 52, 13p. 17 refs. Research rept. on Project NM 006 012.04.54.

DESCRIPTORS: *Cholinesterase, Enzymes, *X-rays, Radiation effects, Body weight, *Intestine, Water, Radiation sickness.

The cholinesterase activity (measured by the colorimetric method of Hestrin) of the small intestine showed significant depression at 15 to 20 hours after 500 r x-irradiation, and reached a maximum of nearly 60 per cent depression by the fourth day, recovered slowly, approaching normal values by the twentieth to twenty-fourth day. Changes in total body weight, and in the weight and water content of the small intestine showed little parallelism, either in degree or in time sequence with cholinesterase activity. The gross appearance of the small intestine paralleled the choline sterase activity more closely than did the histological appearance. Correlation of enzyme changes with intestinal motility was not apparent. (Author)

PB 160 267 $1.10

Naval Medical Research Inst., Bethesda, Md. THE FAILURE OF FOLIC ACID TO ALTER THE CLINICAL COURSE AND HEMATOLOGIC PICTURE OF FATAL SINGLE TOTAL BODY IRRADIATION IN SWINE, by Engene P. Cronkite, John L. Tullis and others. Rept. no. 18 on Project NM 007 039. 30 Sep 48, 8p. 11 refs.

DESCRIPTORS: *Folic acid, Effectiveness, Therapy, *Radiation sickness, *Radioprotective drugs, X-rays, Swine, Blood.

Eight swine were exposed to 400 r total body radiation. Four were treated with untramuscular injections of 45 mg. of folic acid per day. The clinical and hematological courses were observed and postmortem examinations were performed. No differences were observed in the responses of the treated and untreated swine. Folic acid in the dose used was of no value in the therapy of swine exposed to 400 r total body irradiation. (Author)

PB 160 270 $1.60

Naval Medical Research Inst., Bethesda, Md. FAILURE OF RUTIN TO DECREASE THE MORTALITY OF ACUTE IONIZING RADIATION ILLNESS IN MICE, by Eugene P. Cronkite, Dean C. Eltzholtz and others. Rept. no 16 on Project NM 007 039. 19 Aug 48, 11p. 10 refs.

DESCRIPTORS: *Rutin, Effectiveness, Therapy, *Radiation sickness, *Radioprotective drugs.

Rutin was not only of no value in improving the survival of mice simultaneously exposed to a dose of ionizing radiation in the lethal range, but significantly increased the rate at which the mice died. It is considered desirable to repeat this type of investigation on animals with vitamin C requirements similar to man. (Author)

PB 160 358 $1.10

Naval Medical Research Inst., Bethesda, Md. IRRADIATION AND ADRENAL STEROIDOGENESIS. I. INFLUENCE OF IRRADIATION OF ISOLATED ACTH-STIMULATED CALF ADRENALS ON THEIR CORTICOID OUTPUT, by George Rosenfeld, Frank Ungar (Worcester Foundation for Experimental Biology), and others. Vol. 12, p. 275-284. 29 June 54, 10p. 10 refs. Research rept. on Project NM 006 012.04.72; AD-50 045.

DESCRIPTORS: *Adrenal glands, Secretion, *Steroids, Corticosteroids, ACTH, *Gamma rays, Radiation effects, Radioactive isotopes, Cobalt.

The irradiated adrenal cortex does not exhibit pronounced morphological changes, and has been considered a radioresistant tissue on the basis of histological and histochemical findings. This investigation was undertaken to determine the influence of ionizing radiation on the adrenocortical hormone-secretory mechanism or function by studying the corticoid output of irradiated adrenals. The data demonstrate that exposure of the isolated, ACTH-stimulated calf adrenal to moderate doses of gamma-radiation (Co^{60}) during perfusion with homologous blood results in a significantly lower secretion of both hydrocortisone and corticosterone, as determined by paper chromatography of the purified perfusate extracts. The output of these metabolically important corticoids by adrenals irradiated with 1,800 - 2,700 r ranged from 22 to 85 percent less than that of the unexposed, contralateral control glands. Similar significant decreases in unidentified Porter-Silber chromogens ranging from 22 to 96 percent were also observed. Thus, exposure of the isolated, perfused, ACTH - stimulated calf adrenal gland to ionizing radiation induces a partial depletion of its steriod-producing capacity. These studies suggest that from a functional point of view, the adrenal cortex may well be considered a radioresponsive tissue. (Author)

PB 160 359 $1.10

Naval Medical Research Inst., Bethesda, Md. IRRADIATION AND ADRENAL STEROIDOGENESIS. II. STEROID TRANSFORMATIONS BY IRRADIATED ISOLATED PERFUSED CALF ADRENALS, by Frank Ungar (Worcester Foundation for Experimental Biology), George Rosenfeld and others. Vol. 12, p. 285-292. 29 June 54, 8p. 7 refs. Research rept. on Project NM 006 012.04.73; AD-50 044.

DESCRIPTORS: *Adrenal glands, Secretion, *Steroids, Corticosteroids, ACTH, *Gamma rays, *Radiation effects, Radioactive isotopes, Colbalt.

The object of the present investigation was to determine whether the diminished secretion of metabolically important corticoids is attributable to an impaired biosynthesis of the steroid nucleus, a defect in the 11 -, 17 α-, or 21-hydroxylation activity, or to a combination of these possible individual defects. The present studies corroborate the view that the adrenal cortex is a radioresponsive tissue functionally, and indicate that the effect of an ionizing radiation is exerted on all the steroidogenic enzyme systems of the biosynthetic mechanism. (See also PB 160 358)

PB 160 301 $1.10

Naval Medical Research Inst., Bethesda, Md.
THE USE OF SMALL LABORATORY ANIMALS IN MEDICAL RADIATION BIOLOGY. III. REPRODUCIBILITY OF THE LETHAL EFFECT OF TOTAL-BODY IRRADIATION IN MICE, by Friedrich Ellinger, Jasper E. Morgan, and Ellsworth B. Cook. Vol. 11, p. 767-774. 24 Nov 53, 9p. 3 refs. Research rept. on Project NM 006 012.04.65; AD-27 927.

DESCRIPTORS: *Radiation effects, X-rays, Dosage, Radiation sickness, *Laboratory animals.

Reproducibility of the lethal effect of a standard x-ray dose over several years was demonstrated in mice. A total of 586 male white swiss mice (25 ± 3 g each) were used as subjects: 144, 322, and 120 mice received dosages of 400, 410, and 425 r/air. X-rays were generated at 200 kv, 25 ma, and a filtration of 0.25 mm Cu and 1 mm Al which resulted in an HVL of 0.8 mm Cu. The mice were exposed in groups of 12 under full utilization of backscatter. Seasonal variation in the lethal effect of standard x-ray doses was not observed. Data on the mortality produced by various x-ray doses collected over several years resulted in reliable statistics for biological discrimination in the effects of x-ray doses differing by ± 2.5%. Graphs are included for (1) the reproduction of a standard x-ray dose over several years (2) the reproduction of a standard x-ray dose by seasons, and (3) the comparison of different x-ray doses based on material collected in various years. (See also PB 155 375)

PB 160 302 $1.60

Naval Medical Research Inst., Bethesda, Md.
THE USE OF SMALL LABORATORY ANIMALS IN MEDICAL RADIATION BIOLOGY. IV. CORRELATION OF PHYSICAL FACTORS WITH THE BIOLOGICAL EFFECT PRODUCED BY TOTAL-BODY IRRADIATION OF GUINEA PIGS, by Friedrich Ellinger, Jasper E. Morgan and others. Vol. 13, p. 311-324. 27 June 55, 14p. 9 refs. Reserach rept. on Project NM 006 012.04.81; AD-75 560.

DESCRIPTORS: *Radiation effects, *Laboratory animals, X-rays, Dosage, Radiation sickness.

Base-line data on the lethal effect of total-body irradiation have been established on an inbred guinea pig strain to serve as fundamentals for subsequent studies of various problems in medical radiation biology. It has been demonstrated that guinea pigs can be used with an accuracy similar to that previously established for mice. The $LD_{50/14\ days}$ was found by probit analysis of the experimental data to be 337.4 r/air under the exposure conditions used. This study reveals a greater radioresistance of inbred guinea pigs in comparison to hybrid animals used by previous investigators. (Author) (See also PB 160 301)

TID-15964 $3.60

Oak Ridge National Lab., Tenn.
FUTURE PROGRESS IN STUDIES OF THE EFFECTS OF RADIATION ON MAN, by Karl Z. Morgan. 12 June 62, 36p. 28 refs.

TID-14099 $8.10

Presbyterian-St. Luke's Hospital, Chicago, Ill.
BONE RESEARCH. Progress rept. 1960-61, on Contract AT(11-1)-507. 88p. 76 refs.

TID-15354 $1.10

Radiation Research Lab., State U. of Iowa, Iowa City.
A COMPARISON OF THE CYTOLOGICAL EFFECTS PRODUCED BY IONIZING RADIATIONS OF DIFFERENT L.E.T. Technical progress rept. on Contract AT(11-1)-1024. 26 Mar 62. 5p.

TID-15002 $1.10

Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine.
ACUTE RADIOSENSITIVITY OF MICE DIFFERING IN W-GENOTYPE, by Sheldon E. Bernstein. Rept. on Contract [AT(30-1)-1800]. 23 Feb 62, 6p. 11 refs.

TID-14691 $1.10

Upstate Medical Center, State U. of New York, Syracuse.
STUDIES ON PHOTOREACTIVATION IN VITRO, by William D. Fisher. Progress rept. on Contract AT(30-1)-2535. 2 Jan 62, 10p. 11 refs.

Surgery

PB 160 257 $1.60

Naval Medical Research Inst., Bethesda, Md.
EXPERIMENTAL CORONARY OCCLUSION USING A POLYETHYLENE TUBE: A PRELIMINARY REPORT, by W. H. Sewell and D. R. Koth. Vol. 13, p. 259-270. 26 June 55, 12p. 17 refs. Research rept. on Project NM 007 081.26.01.

DESCRIPTORS: *Blood circulation, *Arteries, *Heart, Pathology, Surgery, *Plastic tubing, Thrombosis

Most investigators will readily admit that collateral arterial circulation is much more likely to develop in an area which has an insufficient blood supply than in one with normal circulation. This principle has not been widely used, however, in experimental attempts to develop a new arterial supply to the heart. Current methods for producing experimental cardiac ischemia are either unreliable and do not produce a large infarct, or they cause an excessively high mortality in the dogs. Polyethylene tubes inserted in arteries are subject to gradual occlusion by thrombi. These tubes were placed in the anterior descending coronary artery of the dog, and have successfully produced large infarcts with a low mortality. This procedure is suitable for the production of infarcts which may be used in the study of basic principles underlying the surgical creation of collateral circulation. (Author)

PB 160 262 $1.60

Naval Medical Research Inst., Bethesda, Md.
AN EXPERIMENTAL STUDY ON REFRIGERATED SKIN GRAFTS STORED IN TEN PER CENT HOMOLOGOUS SERUM, by Albert G. Marrangoni. Rept. on Project NM 007 081.10.01. 4 May 50, 18p. 26 refs.

DESCRIPTORS: *Storage, *Skin, *Plastic surgery, *Transplantation, Regeneration Serum, *Preservation.

The method chosen for study was described by Hanks and Wallace using 10 per cent serum and balanced salt solution. This method was tested for tissue viability by tissue culture methods, and compared with freezing and piloform as storage media. The maxium storage time of these grafts is from four to six weeks. Sixty full thickness grafts were studied in the form of autografts, isografts, frozen isografts, isografts stored in piloform and isografts stored in 10 per cent serum. The isografts stored in 10 per cent serum seem more capable of regenerating epithelium as compared with other isografts studied. From these experiments it is believed that 10 per cent serum is superior to other media studied because it buffers and dilutes the acids which result from tissue metabolism. The potentialities of 10 per cent serum as a storage media for skin banks are good. (Author)

Zoology

PB 181 348 $0.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
BUOYANCY AND INSULATION IN THE MUSKRAT ONDATRA ZIBETHICUS, by Kjell Johansen. Oct 61, 9p. 4 refs. Technical rept. 61-15.

DESCRIPTORS: *Mammals, *Fur, Flotation, Thermal insulation, Body temperature.

The amount of air normally trapped in the nonwettable fur of the muskrat has been measured. The average volume of air for 10 muskrats was 176.9 ml, which represents 21.5 per cent of their average total dry volume. The large volume of air in the fur gives the muskrats an average specific gravity of 0.790. The importance of the air layer for the buoyancy and insulation of the muskrat is discussed. (Author)

PB 160 326 $1.10

Naval Medical Research Inst., Bethesda, Md.
CONTACT ACARICIDES: TOXICITY OF SIX INSECTICIDES TO ADULT TICKS (DERMACENTOR ANDERSONI, STILES), by Leo A. Jachowski, Jr. and Carlos Schultz. Rept. no. 1 on Project NM 005 014. 12 May 47, 10p. 2 refs.

DESCRIPTORS: *Insecticides, Antipest impregnants, DDT, Hexachlorocyclohexane, Nicotine, Toxicity, *Parasites, Arachnids, *Ticks, *Acaricides.

The acaricidal properties of six insecticides have beer determined in order to select a standard compound with which new materials can be compared. DDT, hexachlorocyclohexane, Velsicol 1068, nicotine, piperonyl butoxide, and rotenone, applied to small squares of cloth, were tested as contact poisons to adult ticks (Dermacentor andersoni). Criteria for determining a satisfactory acaricide were established as the complete inactivation of ticks within two hours with a contact period of 30 minutes or less. Because hexachlorocyclohexane most closely approximated these criteria, it has been selected as the standard acaricide for the laboratory evaluation of new compounds. (Author)

PB 160 253 $1.10

Naval Medical Research Inst., Bethesda, Md.
AN ENTOMOLOGICAL SURVEY OF PONAPE, EASTERN CAROLINE ISLANDS, by Herbert S. Hurlbut and John I. Thomas. Rept. no. 4 on Project NM 005 007. 5 May 48, 8p.

DESCRIPTORS: *Insects, *Mosquitoes, Diptera, Lice, Ticks, Mites, *Virus diseases, Micronesia

PB 160 271 $1.10

Naval Medical Research Inst., Bethesda, Md.
FAILURE OF THE OFFSPRING OF MOSQUITOES INFECTED WITH JAPANESE B ENCEPHALITIS TO TRANSMIT THE VIRUS, by Herbert S. Hurlbut. Rept. no. 1 on Project NM 005 007.

DESCRIPTORS: Insects, *Mosquitoes, Parasitology, Virus diseases, *Encephalitis.

In order to test the possible role of mosquito offspring in the transmission of a virus, females of Culex pipiens L. and Aedes aegypti L. were infected with the virus of Japanese B. encephalitis by feeding them an emulsion of the brain of an infected mouse. The infectivity of the bites of these mosquitoes was demonstrated by permitting them to bite young mice which subsequently developed the typical symptoms of the disease. The offspring of these mosquitoes failed to transmit the virus when young mice were bitten by them. Similar results were obtained in three tests with C. pipiens and one with A. aegypti. The results indicate that the bites of mosquitoes descended from infected parents are not infective to mice. (Author)

CHEMISTRY

Analytical Chemistry

HW-71517 $1.10

Hanford Atomic Products Operation, Richland, Wash.
SPECTROCHEMICAL DETERMINATION OF RARE EARTH ELEMENTS AT HANFORD, by R. Ko. Rept. on Contract AT(45-1)-1350. 17 Jan 62, 8p. 12 refs.

NASA N62-13828 $1.10

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ON THE GRAVIMETRIC DETERMINATION OF TETRAMETHYL AMMONIUM, by Marianne Buddie and Burton Fine. 1962. 2p. 2 refs.

TID-15658 $2.60

Michigan U., Ann Arbor.
MICROANALYSIS WITH THE GRAPHITE INDICATING ELECTRODE by Philip J. Elving and David L. Smith. Rept. no. 68 on Contract AT(11-1)-1148. 20 Mar 62, 23p. 20 refs.

PB 160 334 $1.60

Naval Medical Research Inst., Bethesda, Md.
IDENTIFICATION AND QUANTITATIVE EXTIMATION OF IRON PENTACARBONYL IN COMMERCIAL CARBON MONOXIDE, by Julius Sendroy, Jr., Harold A. Collison and others. Vol. 13, p. 271-284. 26 June 55, 15p. 20 refs. Research rept. on Project NM 001 056.10.01.

DESCRIPTORS: *Carbon compounds, Monoxides, *Iron compounds, Carbonyl radicals, Chemical analysis, *Spectrographic analysis, Mass spectroscopy, Ultraviolet spectroscopy.

In the course of experimental work in which carbon monoxide from steel containers was used, the presence in the gas of a substance which appeared on qualitative test to be iron pentacarbonyl ($Fe(CO)_5$), was noted. Further investigation led to (1) a study of the dissociation characteristics of this compound by mass spectrometry, and (2) the development of a specific, rapid, and accurate spectrophotometric method for its analysis, with particular application to its presence as an impurity in commercial carbon monoxide. The gas sample, in volume up to 10 liters, is passed through traps in which the pentacarbonyl is condensed or absorbed, then measured at 235 mμ in methanol solution. An accuracy of close to 1 percent is obtained in analyses of samples holding a minimum of 0.04 mg. of $Fe(CO)_5$. The concentrations present in commercial CO in steel cylinders have been found to range from 0.16 to 18 mg. per liter. (Author)

Organic Chemistry

TID-15381 $2.60

Arizona U., Tucson.
STABLE FREE RADICALS IN SOIL HUMIC ACID, by Cornelius Steelink and Gordon Tollin. Rept. on Contract AT(11-1)-908. [1961] 29p. 21 refs.

PB 181 355 $0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
DETERGENCY OF THE 12 TO 18 CARBON SATURATED FATTY ACIDS, by A. Mankowich. 14 June 62, 16p. 4 refs. Rept. no. CCL #123.

DESCRIPTORS: *Soaps, *Detergents, *Fatty acids, Steric acids, Laurates, Sodium palmitate, Sulfonates, Ethylene oxide.

Systems of one surfactant (two anionic and three nonionic types were studied) with an homologous family of soils (the 12, 14, and 18 carbon saturated fatty acids) were explored to determine the relationship of the detergencies of such systems to the physicochemical nature (HLB, hydrophile-lipophile balance) of the soils. A series of systems of ethylene oxide homologs of nonyl phenol with the same soils was also investigated. Neither surfactant HLB nor adsorptive energy of the surfactant polar group, alone, is responsible for the detergency of the 12 to 18 carbon fatty acids. Two semi-logarithmic relationships were derived for the nonyl phenol polyethenoxyether-fatty acid systems; namely, linearity of the R (ethylene oxide mole ratio)-log M/CMC and surfactant HLB-log M/CMC functions (M = surfactant concentration giving ca 100% removal of 16 and 18 carbon fatty acids, and CMC = critical micelle concentration). Fatty acid soaps are poor detergents of the fatty acid soils. Polyoxyethylene (23) sorbitan monolaurate and the 12 and 15 ethylene oxide mole ratio adducts of tridecyl alcohol are poor detergents of the saturated fatty acids. (Author)

PB 181 354 $0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
THE IDENTIFICATION OF POLYOLS IN SYNTHETIC COATING RESINS BY PROGRAMMED TEMPERATURE GAS CHROMATOGRAPHY, PART 2, by G. G. Esposito 10 May 62, 11p. 1 ref. Rept no. CCL #120.

DESCRIPTORS: *Alcohols, Glycols, Butanols, Esters, Amines, Resins, *Plastic coatings, Temperature, *Gas chromatography.

A recently published technique for identification of polyhydric alcohols in coating resins by the use of programmed temperature gas-liquid chromatography is expanded to include four additional polyols recently encountered in new polyesters. The use of alternate amine reagents is explained and illustrated. (Author) (See also AD 259 144)

PB 181 363 $0.50

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
PERCHLORATE ESTER: PREPARATION AND POLYMERIZATION, by J. Radell and J. W. Connolly (Aeronautical Research Lab.). Rept. for 1 Jan 60-1 Jan 61, on The Chemistry and Physics of Materials. Sep 61, 9p. ASD Technical rept. 61-158.

DESCRIPTORS: Synthesis, *Polymerization, *Perchlorates, Esters, Explosives, Propellants

Epiperchloratohydrin (I) was synthesized and polymerized; although covalent perchlorates are known to be hydrolytically unstable. Compound (I), dissolved in benzene could be rapidly washed with water without causing major hydrolysis. A simple method for dehydrating silver perchlorate by an azeotropic distillation was used. Compound (I) before and after polymerization was explosive and required special care. (Author)

TID-15018 $1.60

Ethyl Corp., New York.
THE SYNTHESIS OF ORGANOMETALLIC DERIVATIVES OF THE LANTHANIDE SERIES. Quarterly progress rept. no. 4 for period ending 15 Feb 62, on Contract AT(11-1)-999. [1962] 12p.

TID-15666 $9.10

Fordham U., New York.
THE EFFECT OF THE SOLVENT ON CHELATION, by Mary Virginia Orna. Doctoral thesis. 1961, 105p. 64 refs.

NASA N62-13855 $1.10

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
VISCOELASTIC BEHAVIOR OF POLYMERS AT LONG TIMES, by D. J. Plazek. Semiannual rept., no. 1 for period ending 31 Oct 61, on Grant NsG-147-61. 17 Nov 61. 2p.

PB 160 749 $1.60

Pitman-Dunn Labs. [Group, Frankford Arsenal, Philadelphia, Pa.]
AUTOXIDATION OF THE SATURATED ALIPHATIC DIESTERS. I. A REVIEW OF THE LITERATURE ON AUTOXIDATION OF SATURATED HYDROCARBONS, by H. Gisser. Aug 51, 19p. 60 refs. Rept. R-1018.

DESCRIPTORS: *Aliphatic compounds, *Esters, *Oxidation, *Hydrocarbons, Bibliography, Free radicals, Hydroperoxides, *Reaction kinetics.

This report is a review of the literature on autoxidation of saturated hydrocarbons, and includes such work on the kinetics and mechanism of oxidation of unsaturated hydrocarbons as may be applicable to the autoxidation of saturated compounds. The literature indicates that autoxidation proceeds via chain mechanisms in two phases. In the first phase the end product is hydroperoxide which decomposes in the second via a number of routes to give the usually detected oxidation products. The primary hydroperoxide decomposition products are probably free radicals which initiate new chains, thus catalyzing the first phase of oxidation. (Author)

FXM-218 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
PROPERTIES OF POLYETHYLENE, by L. Topper. 24 Sep 52, declassified 9 May 61. 4p.

UCRL-13038 $1.60

Stanford Research Inst., Menlo Park, Calif.
PREPARATION OF ETHYLENE GLYCOL bis-DIFLUORONITROACETATE, BEAF, by Marion E. Hill and Derek Tegg. Final rept. on Contract AT(04-3)-115. 20 Apr 62, 15p. 5 refs. SRI proj. PRU-3921.

TID-15380 $4.60

Arizona U., Tucson.
LIGHT INDUCED SINGLE ELECTRON TRANSFER REACTIONS BETWEEN CHLOROPHYLL a AND QUINONES IN SOLUTION. I. SOME GENERAL FEATURES OF KINETICS AND MECHANISM, by Gordon Tollin and Gisele Green. Rept. on Contract AT(11-1)-908. 44p. 6 refs.

TID-15629 $1.60

Chemical Lab., Northwestern U., Evanston, Ill.
NUCLEOPHILIC SUBSTITUTION REACTIONS IN OCTAHEDRAL COMPLEXES, by Ralph G. Pearson, David N. Edgington, and Fred Basolo. Rept. on Contract AT(11-1)-1087. [1962] 18p. 15 refs.

TID-15006 $2.60

Connecticut U., Storrs.
STUDIES OF EXCHANGE BETWEEN MOLTEN SALTS AND SOLIDS, by W. C. Orr, R. Ward and others. Annual rept. on Contract AT(30-1)-1154. 30 Nov 61, 23p. 7 refs.

NASA N62-13287 $1.10

Florida U., Gainesville.
NEGATIVE ION FORMATION IN GASES, by E. E. Muschlitz, Jr. and A. S. Whiteman. Status rept., 1 Oct 61-31 Mar 62, on Grant NsG-67-60. Mar 62, 7p. 1 ref.

TID-15017 $1.60

Illinois Inst. of Tech., Chicago.
HIGH TEMPERATURE CHEMISTRY. FUNDAMENTALS OF EFFUSION AND THERMODYNAMICS OF MATERIALS, by Phillip G. Wahlbeck. Technical progress rept. 1 June 61-31 Jan 62, on Contract AT(11-1)-1029. 14p. 10 refs.

NASA N62-12541 $1.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ROTATIONAL RELAXATION AND THE RELATION BETWEEN THERMAL CONDUCTIVITY AND VISCOSITY FOR SOME NONPOLAR POLYATOMIC GASES, by Richard S. Brokaw and Cleveland O'Neal, Jr. 1962, 18p. 23 refs.

TID-15416 $1.10

Los Alamos Scientific Lab., N. Mex.
ELECTRODE POTENTIAL OF ZERO CHARGE (ABSOLUTE ELECTRODE POTENTIAL). A BIBLIOGRAPHY, comp. by Lois Godfrey. Rept. on Contract W7405-eng-36. June 57, 10p. 54 refs.

AD-277 028 repriced $2.25

Monsanto Research Corp., Dayton, Ohio.
A RESEARCH PROGRAM FOR UNDERSTANDING THE MECHANISMS OF FLAME INHIBITION, by G. B. Skinner, D. R. Miller and others. Final rept. 1 Dec 60-30 Nov 61, on Contract AF 33(616)7757. Mar 62, 99p. 17 refs. ASD-TR-61-717.

DESCRIPTORS: *Combustion, Flames, Hydrogen, Oxygen, Hydrazine, Nitrogen compounds, *Flame arresters, Hydrocarbons, Ethanes, Iron compounds, Carbonyl radicals, Metallic compounds, Chlorides, Shock tubes, Spectrographic analysis, *Flame propagation, Inhibition, Chemical reactions.

The effects of inhibitors on the hydrogen-air reaction were studied by measuring flame speeds of hydrogen-air-inhibitor mixtures, and via spectroscopic and shock tube techniques. The best inhibitors were hydrocarbons as a group, several metallic chlorides, 1, 2-di-bromotetrafluoroethane, and iron carbonyl. Tentative explanations for the effectiveness of these inhibitors have been advanced, based on the experimental results and background information from the literature. Screening experiments so far have turned up no inhibitors for the spontaneous ignition of hydrazine in nitrogen tetroxide. The products of the non-flame reaction between hydrazine and dilute nitrogen tetroxide-air mixtures were identified as ammonium nitrate and nitrous oxide, while NH_2, NH and OH free radicals were observed spectroscopically in the hydrazine-nitrogen tetroxide diffusion flame. (Author)

PB 160 329 $1.10

Naval Medical Research Inst., Bethesda, Md.
CORRESPONDING STATES IN MULTILAYER STEP ADSORPTION, by Terrell L. Hill. Vol. 13, p. 843-850. 2 Dec 55, 8p. 16 refs. Research rept. on Project NM 000 018.06.44.

DESCRIPTORS: *Adsorption, *Liquefied gases, *Solidified gases, Argon, Krypton, *Crystal structure.

The successive steps found recently in the physical adsorption isotherms for argon and krypton on a relatively uniform surface (a graphitized carbon black) are interpreted from the point of view of corresponding states in the different layers. It is found that the second and third layers for krypton and the third and higher layers for argon are "normal", in this sense. It is pointed out that the Ising model for a two dimensional hexagonal lattice, some of whose exact properties are known, should be applicable to this problem. (Author)

TID-15379 $1.60

Oklahoma State U., Research Foundation, Stillwater.
A STUDY OF THE LIQUID-LIQUID EXTRACTION AND SEPARATION OF SALTS, by Thomas E. Moore. Interim progress rept. no. 10 on Contract AT(11-1)-71. 26 Mar 62, 14p. 13p.

PB 160 725 $5.60

Research Chemicals Div., Nuclear Corp. of America, Phoenix, Ariz.
RARE EARTH CHALCOGENIDES, by H. M. Muir. Final rept. 1 Aug 60-30 June 61, on Contract NObs-80488. June 61, 52p. Rept. no. RC-180.

DESCRIPTORS: *Chalcogenides, Selenides, Sulfides, Tellurides, *Rare earth compounds, Yttrium compounds, Lanthanum compounds, Praseodymium compounds, Samarium compounds, Erbium compounds, Gadolinium compounds, *Thermoelectricity, Vacuum furnaces, Resistance, X-ray deffraction analysis.

Eleven rare earth chalcogenides, as well as one rare earth "ternary" chalcogenide, have been investigated to evaluate their potential as thermoelectric materials. Specific processing parameters developed for gadolinium sesquiselenide are defined and their effects on electrical and physical characteristics are described. A tentative correlation between the observed "second phase" and a vitreous state in materials having anomalous conduction is presented. (Author)

NASA N62-13728 $1.10

Stevens Inst. of Tech., Hoboken, N. J.
INVESTIGATIONS INVOLVING AN EXPERIMENTAL AND THEORETICAL PROGRAM DESIGNED TO INVESTIGATE VARIOUS PROPERTIES OF THE STRUCTURE OF HELIUM BOTH IN ITS ATOMIC FORM AND IN THE AGGREGATES OF THE LIQUID AND SOLID STATES, by Jack Fajans. Semiannual rept. on NASA Grant NsG-130-61. 15 Oct 61. 3p. Rept. SIT-P46(10/61).

TID-15687 $2.60

Vanderbilt U., Nashville, Tenn.
A DETERMINATION OF THERMODYNAMIC PROPERTIES OF LIQUID 3-METHYLTHIOPHENE BY THE ULTRASONIC METHOD, by George M. Campbell. Master's thesis. Mar 56, 28p. 10 refs.

TID-15387 $1.60

Wayne State U., Detroit, Mich.
THE SOLVENT EXTRACTION OF INORGANIC IONS WITH SURFACE ACTIVE AGENTS, by Arthur M. Wilson. Technical progress rept. on Contract AT(11-1)-775. Mar 62, 14p. 12 refs.

EARTH SCIENCES

Climatology and Meteorology

NASA N62-13755 $1.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STATISTICAL WIND DISTRIBUTION DATA FOR USE AT NASA WALLOPS STATION, by William L. Weaver, Andrew G. Swanson, and John F. Spurling. July 62. 56p. 14 refs. Rept. NASA TN D-1249.

NASA N62-13774 $1.00

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
CAPE CANAVERAL WIND AND SHEAR DATA (1 THROUGH 80 KM) FOR USE IN VEHICLE DESIGN AND PERFORMANCE STUDIES, by James R. Scoggins and William W. Vaughan. July 62. 41p. 19 refs. Rept. NASA TN D-1274.

NASA N62-13725 $4.60

National Aeronautics and Space Administration, Washington, D. C.
METEOROLOGICAL SATELLITES, by Morris Tepper. Status rept. 1962, 46p.

PB 181 357 $0.75

Naval Ordnance Lab., White Oak, Md.
HASP. A FAMILY OF NAVY METEOROLOGICAL ROCKETS, by M. J. Parker. Feb 62, 30p. NOLTR 62-16.

DESCRIPTORS: *Sounding rockets, *High altitude, Upper atmosphere, *Meteorological instruments, Radar tracking, Thermistors, Radar confusion reflectors, Parachutes.

The High Altitude Sounding Projectile (HASP) consists of a separable head which is powered by a 3-inch solid propellant rocket motor. The "winds-only" round uses copper chaff as the payload and has an altitude capability of over 200,000 feet. A metallized parachute, self inflating ROBIN type sphere, and instrument package are other payloads in the HASP family. Radar is used to track the descending device to obtain wind speed and wind direction. (Author)

Order from GPO $0.15 as C 30.2:In7/2

Weather Bureau, Washington, D. C.
THE INSTRUMENTAL PROGRAM OF THE U. S. WEATHER BUREAU. Dec 61, 20p.

DESCRIPTORS: Meteorology, *Meteorological instruments, Meteorological radar, Meteorological balloons, Airports, Instrumentation.

PB 148 590 $7.60

Wisconsin U., Madison.
SPACE AND TIME RESPONSE OF AIRBORNE SENSORS FOR THE MEASUREMENT OF GROUND PARAMETERS, by John A. Dutton. Technical rept. no. 1 on Contracts Nonr-1202(07) and DA 36-039-sc-80282. Sep 59, 76p. 15 refs. AD-234 789.

DESCRIPTORS: *Terrain, Mapping, *Thermal radiation, *Aerial reconnaissance, Radiometers, Bolometers, Functions, *Aerial cameras, Measurement, Aerodynamics, Micrometeorology, Meteorology.

This paper considers the relationships between true values of ground parameters and the values recorded by an airborne system for measuring those parameters. The effects of altitude and speed of the airplane, complexity of the ground surface, and lags and other distortions of the instrument system are considered. The general conclusion is that airborne systems are suitable for measuring averages, but that the measurement of specific values requires greater care. Weighting functions are derived which theoretically allow the reconstruction of the spectral distribution of the ground parameters from the spectrum of the recorded values. In addition, relations are obtained which allow an estimate of the probability of observing small features of various size and number with a given flight path over a large area. (Author)

Geology

HW-69571 $1.60

Hanford Atomic Products Operation, Richland, Wash.
GEOLOGY UNDERLYING HANFORD REACTOR AREAS, by Donald J. Brown. Rept. on Contract AT(45-1)-1350. 1 Mar 62, 21p. 9 refs.

TID-14471 $3.60

William Marsh Rice U., Houston, Tex.
GEOLOGIC ASPECTS OF THE RECOVERY OF THORIUM FROM COMMON ROCKS. Quarterly rept. 1 Sep-30 Nov 61, on Contract W-7405-eng-26. 1 Dec 61, 32p.

Physics of the Atmosphere

NASA N62-13092 $3.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
PRODUCTION AND DIAGNOSTICS OF HYPERVELOCITY LOW-DENSITY STREAMS, by Glen Goodwin. 1962, 33p. 7 refs.

NASA N62-13085 $2.60

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ION SHEATH EFFECTS NEAR ANTENNAS RADIATING WITHIN THE IONOSPHERE, by H. A. Whale. 27 Apr 62, 25p. refs.

NASA N62-12970 $9.10

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
TIME-DEPENDENT STRUCTURE OF THE UPPER ATMOSPHERE, by Isadore Harris and Wolfgang Priester. 12 Apr 62, 102p. 42 refs.

NASA N62-13243 $4.60

Geophysics Corp. of America, Bedford, Mass.
IONOSPHERIC EXPERIMENT FOR THE ECCENTRIC GEOPHYSICAL OBSERVATORY, by L. G. Smith. Rept. on NASA Contract NASw-98. 15 Nov 61, 48p. refs. GCA Technical rept. 61-10-N.

NASA N62-12960 $1.10

Ionosphere Research Lab., Pennsylvania State U., University Park.
EXPERIMENTAL AND THEORETICAL STUDY OF IONOSPHERIC ELECTRON CONTENT AND UPPER IONOSPHERE IONIC PROCESSES BY MEANS OF SATELLITE RADIO TRANSMISSION, by William J. Ross, Leo J. Blumle and others. Semi-annual rept., 1 May-31 Oct 61, on Grant NsG-114-61. 1961, 6p.

NASA N62-13849 $6.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
AN INVESTIGATION OF HORIZONTAL GRADIENTS IN THE ELECTRON CONTENT OF THE IONOSPHERE, by Henry W. Butler. Rept. on NASA Grant NsG-114-61 and Contract DA 18-102A11-6510. 15 July 62. 66p. 12 refs. Scientific Rept. 165.

ENGINEERING

PB 160 758 $1.60

Air Force Special Weapons Center, Kirtland AFB, N. Mex.
AIRCRAFT ACCIDENTS INVOLVING PLUTONIUM CONTAMINATION, by Thomas P. Baker, Jr., Bruce B. Boecker, and James L. Dick. 12 May 58, 17p. 7 refs. AFSWC-TN-58-3.

DESCRIPTORS: *Aviation accidents, Rescue, Fire control, *Radiological contamination, *Plutonium, *Decontamination, Monitors, Personnel.

This publication presents procedures for the delineation and subsequent control and cleanup of an area contaminated by an aircraft accident involving plutonium contamination. The area of concern will be that area contaminated by plutonium to 1,000 micrograms per square meter (ugm/m^2) and/or 1,000 disintegrations per minute per cubic meter of air (dpm/m^3) or greater. This area will be contained within approximately 400 feet radius for 1 weapon, 550 radius for 2 weapons, 650 feet radius for 3 weapons, etc. (Author)

Aeronautical Engineering

NASA N62-13087 $5.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
A CRITICAL REVIEW OF PILOTED FLIGHT SIMULATOR RESEARCH, by Melvin Sadoff and Charles W. Harper. 1962, 57p. 30 refs.

AD-266 352 $19.75

Dayton U. Research Inst., Ohio.
SURVEY OF STRAINS AND LOADS EXPERIENCED BY THE BELL H-13H, VERTOL H-21C, AND SIKORSKY H-34A HELICOPTERS DURING SERVICE OPERATION, by Bruce Truett, Stanley Back and others. Final rept. June 57-Nov 60, on Contract AF 33(616)5366. May 61, 311p. WADD Technical rept. 60-818.

DESCRIPTORS: *Helicopters, Helicopter rotors, Operation, Take-off, Landing, Acceleration, Air speed, Stresses, Moments, Load distribution, Measurement, Instrumentation, Flight testing, Tests, Mathematical analysis, Statistical analysis, Tables

Two each of three helicopters models (the H-13H, the H-21C, and the H-34A) were instrumented to yield strain and operational load information. Data were acquired during several months of service operation by U. S. Army organizations. Load and strain histories are presented in graphical and tabular form. A statistical study was undertaken to investigate sampling techniques and other statistical aspects of the program. (Author)

PB 160 697 $12.00

Flight Control Lab., Wright Air Development [Div.] Wright-Patterson AFB, Ohio.
FLIGHT TEST EVALUATION OF AIRCRAFT PRESSURE ALTIMETER INSTALLATIONS, by Russell L. Fine. Oct 56, 166p. WADC Technical note 56-438; AD-110 554.

DESCRIPTORS: *Flight instruments, *Altimeters, Pressure, Flight testing, Errors, Calibration.

The Radio Technical Commission for Aeronautics, Washington, D. C. is conducting a study of the problems associated with the measurement of aircraft altitude and its relationship to aircraft traffic control. Results of USAF participation in one phase of this study are presented relative to accurate flight calibration of the altimeter systems of a large number of military and scheduled air carrier aircraft. The flight evaluation establishes quantatively the errors of the aircraft pressure altimeter installation and the repeatability of these errors from aircraft to aircraft of the same configuration. The majority of aircraft exhibited reasonable correlation of altimeter installation errors and handbook values and the variation of installation errors between aircraft of the same configuration was normally small. Installation errors of a number of aircraft, particularly high speed aircraft, are of such a significant magnitude as to affect aircraft vertical separation. (Author)

NASA N62-13878 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FLIGHT-TEST INVESTIGATION OF AILERONS AS A SOURCE OF YAW CONTROL ON THE VZ-2 TILT-WING AIRCRAFT, by Robert J. Pegg. July 62. 25p. 8 refs. Rept. NASA TN D-1375

NASA N62-13850 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LONGITUDINAL STABILITY AND CONTROL OF A TILT-WING AIRCRAFT WITH RIGID AND FLAPPING PROPELLER BLADES, Louis P. Tosti. July 62. 22p. 7 refs. Rept. NASA TN D-1365.

PB 160 728 $8.10

National Aviation Facilities Experimental Center, Atlantic City, N. J.
THE DEVELOPMENT AND EVALUATION OF A FIRE-EXTINGUISHING SYSTEM FOR THE MARTIN YP6M AIRPLANE, by Joseph Osman. Apr 60, 82p. 2 refs. Technical Development rept. no. 409; TA 59-213.1; AD-252 831.

DESCRIPTORS: *Jet flying boats, *Fire extinguishers, *Nacelles, Jet engine fuels, Hazards, Tests, Ignition, Sparks, Explosions.

A fire-extinguishing system, proposed for the YP6M airplane and designed by the Martin Company, was evaluated using a steel mockup of one of the YP6M airplane nacelles. Evaluation of the system was accomplished by conducting quantity and rate-measurement tests, by measuring nacelle extinguishing agent concentrations during discharge of the system, and by full-scale fire-extinguishing tests. The nacelle airflows for flight and surface operating conditions were simulated during the tests. Explosive hazard studies were conducted on the XP6M cooling air configuration and a modified cooling air system whereby the rotational air flows were replaced by straight fore-to-aft flow. JP-4 fuel was released in the nacelle at various rates and locations and the results of delayed spark and open flame ignition were observed. (Author)

AD-277 186 repriced $1.50

Norair Div., Northrop Corp., Hawthorne, Calif.
STUDY OF THE USE OF STRUCTURAL MODELS FOR SONIC FATIGUE, by Cory L. Gray. Rept. on Dynamic Problems in Flight Vehicles, Contract AF 33(616)7030. Apr 62, 56p. 29 refs. Rept. no. NOR 61-215; ASD-TR-61-547.

DESCRIPTORS: *Fatigue (Mechanics), Model tests, Statistical analysis, Instrumentation, Design, *Jet engine noise.

The feasibility of employing reduced scale structural models for sonic fatigue testing has been examined theoretically and experimentally. Scaling laws for structure and for jet noise sources have been presented and theoretical fatigue aspects discussed. Application of the theory to simple flight vehicle type structure was then investigated. Twenty-five panel specimens in three scales and eighteen fatigue coupons in two scales were tested to failure with proportionately scaled forcing functions. The results indicate that an empirical relationship between scale factor and fatigue life exists, and that fatigue modeling techniques are feasible and practical. (Author)

Chemical Engineering

HW-SA-2564 $9.10

Idaho U., Moscow.
AN EXPERIMENTAL INVESTIGATION OF TWO PHASE FLOW PRESSURE LOSSES IN PIPE ELBOWS, by Theodore Lee Deobald. Master's thesis. Rept. on Contract AT(45-1)-1350. 1962, 108p. 18 refs.

TID-15483 $1.60

Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
AUTOMATIC LIQUID NITROGEN PUMPING SYSTEM, by Matti K. Selomaa. 25 Apr 62, 13p.

Electrical and Electronic Engineering

PB 160 582 $2.60

Battelle Memorial Inst., Columbus, Ohio.
THERMOELECTRIC POWER GENERATION AND RELATED PHENOMENA, by T. S. Shilliady. Bimonthly rept. no. 9, 7 May-7 July 60, on Contract NObs-77034. 30 Aug 60, 22p. 8 refs. AD-245 862

DESCRIPTORS: *Thermoelectricity, Power, *Materials, Electrical properties, Metallurgical analysis, Metallic compounds, Alloys, Gallium compounds, Aluminum compounds, Arsenides.

Alloys of nominal molar composition 80 Gallium Arsenide- 20 aluminum arsenide were prepared by zone leveling and by crystallization from solution, using improved preparation techniques in the latter method. Electrical properties of specimen from previously prepared alloy ingots were measured at temperatures as high as 742 deg C. Thermal diffusivity apparatus was was used to measure a series of physical parameters. Values in accord with independent measurements were obtained. Techniques were improved for the measurement of isothermal and adiabatic values of the Hall coefficient and resistivity over a wide range of temperatures. (See also PB 160 581)

WAPD-T-1473 $2.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
CONTROL ENGINEERING APPLICATIONS OF V. I. ZUBOV'S CONSTRUCTION PROCEDURE FOR LYAPUNOV FUNCTIONS, by S. G. Margolis and W. G. Vogt. Rept. on Contract AT(11-1)-GEN-14. 25 Jan 62, 24p. 7 refs.

AD-278 382 $1.00

Diamond Ordnance Fuze Labs., Washington, D. C.
CW FUZE SIMULATOR: SYSTEM DESIGN, by Harry F. Shaw. 30 Apr 62, 34p. 3 refs. Rept. no. TR-1005.

DESCRIPTORS: *Fuzes, Simulation, *Antennas, *Amplifiers, *Oscillators, Operation, *Telemeter systems.

The theory of operation, installation, and maintenance of a longlife standard (conventional CW doppler) fuze and telemeter system designed for experimental work are described. The fuze longitudinally excites a lightweight artillery-type vehicle as its antenna and operates for 8 hr on internal batteries. A telemeter with wide frequency response on each of three separate FM channels is employed. (Author)

PB 160 729 $9.60

DuMont, Allen B., Labs., Inc., Clifton, N. J.
THE OPTIMIZATION OF EVAPORATED PHOSPHOR FOR IMAGE TUBE USE, by Joseph G. Koosman. Final rept. on Contract DA 44-009-eng-3714. [1960] 117p. AD-234 600.

DESCRIPTORS: *Cathode ray tube screens, Phosphors, Vaporization, Vapor plating, Zinc compounds, Silicates.

Research was made to develop an evaporated phosphor which would improve the imaging characteristics of image converter or intensifier tubes while maintaining as high a luminous efficiency as possible. The conclusion was reached that P-1, zinc orthosilicate, manganese activated, remains the outstanding choice for an evaporated screen with reasonable high luminous output by electron bombardment. Besides being physically and chemically compatible with a silica substrate, it is relatively insensitive to poisoning, and it is conveniently processed without special atmospheres. The major drawback to more extensive use, besides color preference, is the fact that the processing temperature of 1100°C after evaporation requires the use of quartz rather than usual glasses as the transparent substrate. Variations of a basic P-1 formulation were processed and evaluated for light output. If operation of the phosphor screen is fixed at about 15kv, peak brightness is obtained with a layer less than a micron thick. Resolution, as judged by turbidity, depends on the number of steps used in building up this thickness, the number of intermediate heat treatments, and the degree of polishing employed. One set of phosphor screen specimen slides were submitted incorporating those parameters believed pertinent to comparative resolution capacity.

PB 160 744 $9.10

Eagle-Picher Research Labs., Joplin, Mo.
RESEARCH AND DEVELOPMENT OF ORGANIC EXPANDERS APPLICABLE TO LEAD-ACID STORAGE BATTERIES, by E. J. Ritchie. Final analytical rept., pts. 1 and 2 (Rept. no. 14) 16 June 52-31 Dec 55, on Contract DA 23-072-ORD-330. [1956] 105p. 9 refs. AD-83 925.

DESCRIPTORS: *Storage batteries, Organic compounds, Additives, Electrolytes, Statistical analysis, Analysis of variance, Tests, Lead, Acids.

One hundred thirty organic addition agents have been tested in negative plates of lead acid storage batteries at temperatures from -65°F. to +80°F. The data have been examined for trends and relationships existing between the chemical structure, method of preparation, or nature of the starting material used in the preparation of the agent and the effect of the agent upon negative plate performance. The variables entering into the preparation of the test batteries have been studied with the aid of statistical methods in order to determine the statistical significance that may be assigned to the data and the observed differences in behavior of both control batteries and the agents under test. Some of the possible sources of large experimental deviations common to battery testing are discussed. The influence of solubility on the effectiveness of an addition agent is considered and a preliminary study of organic addition agents added to the electrolyte is reported. (Author)

DC-60-6-174 $2.60

General Electric Co., Cincinnati, Ohio.
2400 CYCLE MAGNETIC AMPLIFIERS, by S. F. Hemmenway, F. K. Hiser, and J. A. Russell. Status rept. on Contract AT(11-1)-171. 29 June 60, 31p.

DC-60-8-32 $1.60

General Electric Co., Cincinnati, Ohio.
ADVANCED VIEWING STUDIES FOR REMOTE HANDLING OPERATIONS, by J. E. Brown. Preliminary rept. on Contract AT(11-1)-171. 2 Aug 60, 14p.

DC-59-6-143 $11.00

General Electric Co., Cincinnati, Ohio.
D102A CONTROL SYSTEM RELAY, LAMP, AND METER CIRCUIT HANDBOOK, by W. T. Miller and M. H. Ferguson. Preliminary rept. on Contract AT(11-1)-171. 1 July 59, declassified 10 Aug 61, 142p.

DC-55-11-11 $4.60

General Electric Co., Cincinnati, Ohio.
RADIATION DAMAGE REPORT, by W. J. Stapp. Preliminary rept. on Contract AT(11-1)-171. [1955] Declassified 5 Sep 61. 43p.

PB 160 745 $3.60

Houghton Labs., Inc., Olean, N. Y.
RESEARCH STUDY FOR IMPROVEMENT OF INSULATING COATING FOR PRINTED CIRCUITRY, by Mark V. Goodyear and Donald W. Rice. Quarterly progress rept. no. 1, 1 Feb-30 Apr 55, on Contract DA 36-039-sc-64608. [1955] 34p. 8 refs. AD-74 653.

DESCRIPTORS: *Printed circuits, *Electric insulation, *Materials, Epoxy resins, Waxes, Phenolic resins, Coatings, Circuits

Research was undertaken to develop a protective coating which will provide adequate protection for printed circuits over long storage periods and prevent electrical deterioration during and following high humidity conditions. The investigation encompasses epoxy resins, polyester-type resins, phenolic-type coatings, and silicone-type coatings on XXXP etched, copper-foil clad, paper-base phenolic laminates. The wetting of the base laminate by unmodified epoxy resins was unsatisfactory. Various methods of preparing the laminate, such as scrubbing with steel wool and washing with EtOH, yielded no improvement. Fillers and thickening agents gave unsatisfactory results. Edge covering was poor. Large amounts of air were trapped in the resin. Mixtures were placed under vacuum, but this did not completely deair the filled resins. Synthetic waxes and phenolic resins were used in modifying the epoxides with good results. Humidity cycling graphs of Epoxy-Acrawax C, Epoxy-Durez 7421A, and Epoxy-Polyamide 115 systems showed good possibilities.

NASA N62-11715 $8.60

Institute for Defense Analyses, Washington, D. C. RESEARCH AND DEVELOPMENT ON POWER SOURCES AND ENERGY CONVERSION IN THE DEPARTMENT OF DEFENSE, AEC, AND NASA, by Nathan W. Snyder. Rept. on Contract SD-50. 16 May 60, 90p. Technical rept. 61-4/U.

PB 160 737 $2.60

International Resistance Co., Philadelphia, Pa. RESISTORS, VARIABLE (FILM TYPE) by Stanley R. Kingsbury. Quarterly progress rept. no. 3, 1 Dec 58-28 Feb 59, on Contract DA 36-039-sc-75981. [1959] 26p. AD-219 029.

DESCRIPTORS: *Variable resistors, Production, Noise, Reduction, Films, Design

Excessive noise after rotational life was encountered, and a large portion of the quarter was spent developing methods of minimizing this effect. Among the changes intended to produce a quite potentiometer are wiper materials and design, substrate surface finishes, and surface lubricants. Test results on many of the newer modifications are not yet available. The prototype 1-in. housing was completed. (Author)

PB 160 738 $2.60

International Resistance Co., Philadelphia, Pa. RESISTORS, VARIABLE (FILM TYPE) by Stanley R. Kingsbury. Quarterly progress rept. no. 4, 1 Mar 58-31 May 59, on Contract DA 36-039-sc-75981. [1959] 23p. AD-225 342.

DESCRIPTORS: *Variable resistors, Production, Finishes, Films, Design

An evaluation for suitable substrates and substrate preparation was continued. The 25 μ in. surface finished Alsinmag 614 was abandoned due to this quarter's evaluation. Coors Alumina AD99, in both 5 and 25μ-in. surface finishes were received. Units were fabricated from the 5-μ in surface finished blanks and preliminary test results are encouraging. Work continued on the design and material for a suitable wiper. The major problem appears to be the balancing of the noise and wear characteristics of the higher range units. A continuing film evaluation was carried on in an effort to design a reproducible film for high range use. A design change in the terminals appears to have overcome the problems of rivet hole cracks and loose terminals. Three methods of adjusting and tapering were tried with arc erosion showing the best results. The production design for the 1-in. pot was modified by changing the terminal and collector ring assembly. (Author) (See also PB 160 737)

PB 160 739 $3.60

International Resistance Co., Philadelphia, Pa. RESISTORS, VARIABLE (FILM TYPE) by B. Ingster. Quarterly progress rept. no. 5, 1 June-31 Aug 59, on Contract DA 36-039-sc-75981. [1959] 35p. AD-233 033.

DESCRIPTORS: *Variable resistors, *Resistors, Films, Design, Production

The carbon alloy film system on Coors AD99 ceramic using a National Carbon brush grade carbon-graphite wiper has been tested in resistance ranges of 100 ohms to 60,000 ohms. Performance of the 5 microinch substrate has been superior to that of a 25 microinch substrate. Wiper pressures of 70 grams have shown lower noise levels than those with 25 grams. Metal film and resistive glaze elements were also fabricated and tested. While performance levels of these films were not as good as those observed for carbon alloy, it is thought that additional work may yield more satisfactory results. Several methods of adjusting elements to range and of forming tapers were tried. Preliminary indications are that sandblasting will be a preferred adjusting method. Tapers will probably be formed by deposition of a low range film, electrolytic removal of about 50% of this film, and, finally, deposition of a high range film. Housing design will depend to a great extent on the heat sinking required by the film. Two types of housing heat sinks are now on load life test using carbon alloy films as the resistive element. (Author) (See also PB 160 738)

NASA N62-13859 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. ANALYSIS, DESIGN, AND TESTING OF A POSITION SERVO UTILIZING A STEPPER MOTOR, by J. C. Nicklas. Rept. on Contract NAS7-100. 25 Jan 62. 24p. 5 refs. Rept. JPL-TR-32-206.

NASA N62-13861 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. TRANSIENT TIMES IN FISSION-ELECTRIC POWER ELEMENTS, by Detlef Kamke. Rept. on NASA Contract NAS7-100. 10 May 62. 21p. 3 refs. Rept. JPL TR-32-254.

AD-277 171 repriced $1.50

Lockheed Missile and Space Co., Sunnyvale, Calif. NEW CATHODE-ANODE COUPLES USING NONAQUEOUS ELECTROLYTES, by J. E. Chilton, Jr. Rept. for Mar-Nov 61, on Contract AF 33(616)7957. Apr 62, 58p. 18 refs. LMSC-2-02-62-1; ASD-TDR-62-1.

DESCRIPTORS: *Storage batteries, *Electrolytes, Organic compounds, Conductivity, Lithium, Electrodes, Aluminum electrodes, Anodes, (Electrolytic cell), Cathodes (Electrolytic cell), Organic solvents, *Electrochemistry.

New anode-cathode couples using nonaqueous solvents are investigated for use as secondary batteries for power sources in orbiting satellites. Reversibility of anode and cathode reactions in nonaqueous media was studied by measuring the current efficiency for metal deposition or dissolution as a function of current density. At densities of 20 ma/cm^2, magnesium from a magnesium ethyl bromide-ethyl ether solution, potassium from a phosphorous oxychloride-potassium iodide system, aluminum from an aluminum chloride-n hexylamine-ethyl ether system show low reversibility. High current efficiencies were found for lithium electrodeposition from a propylene carbonate-lithium salt system and for aluminum electrodeposition from an aluminum chloride-ethyl pyridinium bromide-toluene system at 20 ma/cm^2 current density. After anodic

oxidation of many metals, nickel chloride and silver chloride were found to be insoluble in the propylene carbonate system; nickel chloride was found to be insoluble in the aluminum chloride-ethyl pyridinium bromide-toluene solution. (Author)

TID-15417 $1.60

Los Alamos Scientific Lab., N. Mex.
PERTURBATION EFFECTS ON ELECTROMAGNETIC CAVITY RESONATORS. A BIBLIOGRAPHY, comp. by Bettina Hoerlin. Rept. on Contract W7405-eng-36. 29 July 57, 12p. 30 refs.

TID-15418 $2.60

Los Alamos Scientific Lab., N. Mex.
PRODUCTION OF HIGH CURRENT ELECTRON BEAMS, ELECTRON GUNS, AND ELECTRON OPTICS OF HIGH CURRENT ELECTRON BEAMS. A BIBLIOGRAPHY, comp. by Gretchen R. Riese. Rept. on Contract W7405-eng-36. 8 Aug 57, 21p. 60 refs.

PB 160 695 $4.60

Mallory, P. R., and Co., Inc., Indianapolis, Ind.
DEVELOPMENT OF PRINTED CIRCUIT TECHNIQUES, by George Voida and Christian E. Miller. Final rept. 11 Aug-31 Dec 52, on Contract NObsr-52502. 31 Dec 52, declassified 6 May 58. 41p. 11 refs. AD-6045.

DESCRIPTORS: *Printed circuits, Circuits, Materials, *Plastics, Temperature, Binders.

Techniques are described for developing conducting prints on high-temperature plastics by the pressed-Ag-powder method. The printed conductors were suitable for operation in various adverse environments and at temperatures of -65° to 200°C. The printed circuits registered on tetrafluoroethylene (Teflon) glass laminate exhibited unusual Ag-insulator bond retention after cycling, vibration, humidity, wear, continuous 200°C exposure, and continuous current-carrying capacity tests. Filler-resin compositions of Teflon or monochlorotrifluoroethylene (Kel-F or Fluorothene), and glass laminates bonded with Fluorothene, silicone, ethoxylene, triallyl cyanurate, and modified polyester resins exhibited some promise. Soldered joints stable for extended service at 200°C were developed by using proper soldering techniques. The pressed-powder process, which is adaptable to mass production, can produce flush circuits for electrical and electronic instruments operating under extreme conditions.

PB 160 747 $3.60

Mallory, P. R., and Co., Inc., Indianapolis, Ind.
RESEARCH AND DEVELOPMENT LEADING TO ESTABLISHMENT OF DESIGNS FOR ELECTROMECHANICAL COMPONENTS FOR PRINTED CIRCUITS, by Lowell G. Brodrick, Joseph P. Morone, Jr. and Fred L. Rogers. Quarterly progress rept. no. 2, 1 Sep-30 Nov 54, on Contract DA 36-039-sc-63181. [1954] 33p. 1 ref. AD-54 910.

DESCRIPTORS: *Miniature electronic equipment, *Printed circuits, Transistors, Plugs (Electricity), Rotary switches, Design

Preliminary model designs for all seven components to be developed on the contract were completed early in the second quarterly period. Before orders were placed for parts, each of the designs was carefully analyzed electrically, mechanically, and dimensionally. Each part was also studied to see if it lent itself to economical quantity production. As a result of these analyses, several minor changes were made in each component. After competitive bids were received, orders were placed for molded parts of the sockets, plug, and receptacle. Molding difficulties have delayed the expected delivery of these parts beyond the end of the period covered by this report. All metal parts for the sockets, plug, and receptacle were made in the Mallory model shop, as were all parts for the switch. Samples of the switch were assembled, tested, and found satisfactory except for minor deficiencies later corrected. Preliminary development models of the switch, along with supporting technical data, summarized in this report, were sent to SCEL for approval in this period. (Author)

NASA N62-13862 $8.10

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
RELIABLE ELECTRICAL CONNECTIONS: VOL. 1., by James A. Gay, Jr. 15 Aug 61. 84p.

AD-272 527 repriced $0.75

Naval Ordnance Lab., Corona, Calif.
INTERPRETATION OF PHOTODETECTOR PARAMETERS, by J. D. Merriam and W. L. Eisenman. Rept. no. 49 on Photodetector Series. 15 Jan 62, 27p. 4 refs. NOLC rept. 558.

DESCRIPTORS: *Infrared detectors, *Infrared photoconductors, Infrared radiation, Detection, Measurement, Signal-to-noise ratio, Sensitivity, Standards, Test methods.

The parameters and figures of merit used by NOLC in evaluating photodetectors are defined and interpreted. To make the data reported in the NOLC photodetector series of reports more useful, a method is given for determining a photodetector's behavior under conditions other than those measured and reported. (Author)

PB 181 323 $0.50

Navy Electronics Lab., San Diego, Calif.
ELECTROLUMINESCENT INDICATOR LIGHT, by R. B. Nehrich, Jr. 22 Jan 60, 8p. 6 refs. Research and development rept. 946; AD-254 538.

DESCRIPTORS: *Luminescent materials, *Glow lamps, Luminescence, Electrical properties, *Lighting equipment, *Indicator lights.

An electroluminescent lighting device was developed which can serve as a highly efficient pilot and/or indicator light. Its ease of replacement simplifies the general maintenance of electronic systems; it offers long life and high reliability; and it is adaptable to a variety of applications and mounting techniques. (Author)

UNM-TR-EE-73 $3.60

New Mexico U. Engineering Experiment Station, Albuquerque.
HYPERSONIC PLASMA GENERATOR, by Andre LeBlanc and W. W. Grannemann. Technical rept. EE-73. Apr 62, 32p. 7 refs.

PB 160 743 $8.60

New York U. Coll. of Engineering, N. Y.
DEVELOPMENT AND EVALUATION OF AN AIR TRANSPORTABLE SHELTER FOR GROUND ELECTRONIC EQUIPMENT (BUILDING, PREFABRICATED, PANELIZED, S-119(XW-1)/G), by Wm. D. Murray and Harold Gussaroff. Final rept. on Contract AF 30(602)205. Apr 56, 85p. Technical rept. 222.09; RADC-TR-56-76: AD-98 090.

DESCRIPTORS: *Shelters, *Prefabricated buildings, Airborne, Sandwich panels, *Ground support equipment, Electronic equipment.

The work was broken down into three phases: (1) development of the General Purpose Shelter; (2) evaluation of the General Purpose Shelter; (3) investigation of a Simplified Trailer Van. The report discusses these three phases with emphasis on the last two. Detailed reports of the evaluation are included. Conclusions on the program and recommendations for future work are discussed. (Author)

PB 160 731-1 $8.10

Nickel Cadmium Battery Corp., Easthampton, Mass.
RESEARCH STUDIES ON THE BEHAVIOR OF THE SINTERED-PLATE NICKEL-CADMIUM BATTERY, by Arthur Fleischer. Quarterly progress rept. no. 1, 1 Mar-31 May 53, on Research Investigations to Study the Negative Plate and Devise Methods for Improving Performance, Contract DA 36-039-sc-42651. 29 June 53, 82p. 10 refs. AD-14 974.

DESCRIPTORS: *Alkaline cells, Nickel, Cadmium, *Storage batteries, Tests, Sintering, Anodes (Electrolytic cell)

The purpose of the experimental program is to conduct research investigations on the behavior of the negative plate of the sintered plate nickel-cadmium alkaline storage battery that are directed to determine the reasons for any change in capacity on cycling and to devise methods for improving the performance of the negative plate.

PB 160 731-2 $9.10

Nickel Cadmium Battery Corp., Easthampton, Mass.
RESEARCH STUDIES ON THE BEHAVIOR OF THE SINTERED PLATE NICKEL-CADMIUM BATTERY, by Arthur Fleischer. Quarterly progress rept. no. 2, 1 June-31 Aug 53, on Research Investigations to Study the Negative Plate and Devise Methods for Improving Performance, Contract DA 36-039-sc-42651. 25 Sep 53, 102p. 15 refs. AD-20 066.

DESCRIPTORS: *Alkaline cells, Nickel, Cadmium, *Storage batteries, Tests, Sintering, Anodes (Electrolytic cells).

Twenty-four cells having singly-impregnated negative plates and two-plate positive groups with plates impregnated three times were assembled, formed and cycled at the 37.5 ampere rate. All of the cells in the new group had plates of the model 2500 design as described. Cycling of cells assembled with Webril felted cellulose separators through the 287th cycle has demonstrated the persistence of the improvement of the cycling characteristics of the negative plate. Cycling of two pairs of cells having singly-impregnated plates through the 197th cycle at the 37.5 ampere and 10 ampere discharge rates has shown a persistence on the improvement of cycling characteristics in the cells to which electrolyte containing oxidized cellulose as addition agent was added on the 50th cycle. Cycling of cells with negative plates impregnated four times and containing beta-cellulose extracted from a special grade of paper pulp by electrolyte has shown a marked improvement in the cycling characteristics of the negative plate. Cycling of cells having electrolyte containing the alkali-soluble cellulose derivatives, carboxymethyl cellulose, natrosol and carboxymethyl hydroxyethyl cellulose shows the persistence in improvement of cycling characteristics of the negative plate, adding further confirmation to the hypothesis on the effect of soluble cellulose derivatives. Cycling characteristics of a singly-impregnated negative plate were improved by the addition of starch to the electrolyte of a cell cycled 98 times. (See also PB 160 731-1)

PB 160 731-3 $8.10

Nickel Cadmium Battery Corp., Easthampton, Mass.
RESEARCH STUDIES ON THE BEHAVIOR OF THE SINTERED PLATE NICKEL-CADMIUM BATTERY, by Arthur Fleischer. Quarterly progress rept. no. 3, 1 Sep-30 Nov 53, on Research Investigations to Study the Negative Plate and Devise Methods for Improving Performance, Contract DA 36-039-sc-42651. 29 Dec 53, 82p. 11 refs. AD-26 315.

DESCRIPTORS: *Alkaline cells, Nickel, Cadmium, *Storage batteries, Tests, Sintering, Anodes (Electrolytic cell)

A group of 22 cells was assembled with plates impregnated in nitrate solution to study the effect of the concentration of addition agents such as Natrosol and starch. An optimum concentration of 1 g/l of Natrosol improved cycling characteristics. Starch was less effective than cellulosic compounds. Electrolyte prepared by the treatment of finely cut Puto-300 cellophane with KOH solution was effective in maintaining capacity on cycling. Felted nylon separator which was bonded with Geon resin tended to froth on charge. Addition of Ni and Fe to $CdCl_2$ impregnating solution did not improve the cycling characteristics of the negative active material. The addition of Ni increased the initial coefficient of utilization of the active material. A maximum conversion of Cd to $Cd(OH)_2$ occurred in plates impregnated in $CdCl_2$ solution containing 10 g of nickel chloride hexahydrate/liter; the extent of conversion depended apparently on the carbonyl Ni powder used in sintering the plaques. After-impregnation with concentrated solutions of polyethylene glycols was effective in maintaining capacity of the negative plate on cycling. The effect of high rate charging is discussed on singly and fully impregnated plates. The design of the BB221/U replacement battery was completed. (See also PB 160 731-2)

PB 160 731-4 $9.10

Nickel Cadmium Battery Corp., Easthampton, Mass.
RESEARCH STUDIES ON THE BEHAVIOR OF THE SINTERED PLATE NICKEL-CADIMUM BATTERY, by Arthur Fleischer. Final rept. 1 Dec 53-28 Feb 54, on Research Investigations to Study the Negative Plate and Devise Methods for Improving Performance, Contract DA 36-039-sc-42651. 25 Mar 54, 101p. 23 refs. AD-35 245.

DESCRIPTORS: *Alkaline cells, Nickel, Cadmium, *Storage batteries, Tests, Sintering, Anodes (Electrolytic cell).

Cycling-test studies were continued on 45 cells to determine the effect on cycling characteristics of the negative plate of high-rate charging and of various addition agents. High-rate charging improved the cycling characteristics, and the interposition of low-rate charging led to a prompt loss in capacity. Cycling of cells having singly impregnated (nitrate) negative plates and electrolyte containing the organic compounds with N groups showed no effect on the cycling behavior through 74 c. Cycling of cells having singly-impregnated (nitrate) negative plates and electrolyte containing starches varying in molecular weight showed an improved effect on continuation of testing through 74 c. Continuation of cycling tests on singly impregnated plates to study the effect of concentration of Natrosol, a soluble cellulose compound from 0.1 to 10 g/l of electrolyte, showed an optimum effect at a 2 g/l concentration. Electrolyte containing polyacrylic acid, using from 1 to g/l concentrations and 2 samples varying in molecular weight, showed no effect on the behavior of chloride-impregnated negative plates on cycling. (See also PB 160 731-3)

PB 160 689 $4.60

Pacific Semiconductors, Inc., Culver City, Calif.
INTRINSIC-BARRIER TRANSISTOR TECHNIQUES (SILICON), by D. L. Buie, J. Cohen, and R. D. Hancock. Quarterly rept. no. 7, 15 Jan-15 Apr 59, on Contract DA 36-039-sc-74887. [1959] 48p. 2 refs. PSI rept. no. 3000:15-20-Q; AD-218 653.

DESCRIPTORS: *Transistors, *Silicon, Design, Very high frequency, High frequency, Frequency, Manufacturing methods, Diffusion

Ruling techniques, including equipment, are discussed in relation to forming small structures applicable to silicon transistors made by diffusion. Some changes in furnace equipment now show better control of diffused junctions. Device design of the collector and collector-contact regions are considered. A method for computing the collector capacitance when the base-collector regions are formed from diffused impurities is given. An extension of this is shown to give a ready solution for base layer punch-through calculations. An explanation is given of the probable cause of a high collector extrinsic resistance and ways to specify the collector region design in cases where high-frequency operation at low collector voltage and high collector current may be important. (Author) (See also PB 142 768)

PB 160 715 $13.50

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
REGENERATIVE FUEL CELL SYSTEM INVESTIGATION, by J. M. Fuscoe, S. S. Carlton, and D. P. Laverty. Rept. on Contract AF 33(600)39573. May 60, 198p. 19 refs. Rept. no. ER-4069; WADD Technical rept. 60-442; AD-249 256.

DESCRIPTORS: *Fuel cells, *Power supplies, Heat exchangers, Design, Lithium compounds, Hydrides, Chlorides, Electrolytes, Radiation damage, Nuclear power plants.

This report covers the first phase of an applied research program leading to the design of thermally regenerative lithium hydride fuel cell systems. Various fuel metals and halogen gases are examined theoretically, leading to the selection of the lithium metal-hydrogen gas couple. Component studies are outlined and result in several suggested solutions to the problem of weightless operation. Fuel cell and regenerator studies are discussed and design information obtained from these studies is listed. Data is presented as the result of several test runs of both a small experimental fuel cell and a large bulk cell. Analysis is made of the information obtained during the cell experiments and the regeneration work. Various methods are discussed for converting individual cell output to the total power requirement of the specific systems under development. (Author)

PB 160 694 $2.60

United States Electronics Corp., Lyndhurst, N. J.
ELECTRONIC PACKAGED SUBASSEMBLIES, AUTOMATIC OR SEMI-AUTOMATIC PRODUCTION OF, USING PRINTED CIRCUITS, by Stephen Horbach and John W. Wolfe. Final development rept. for 1 Sep 51-31 Aug 52, on Contract NObs-5234. 1 Oct 52, declassified 21 Aug 52, 29p. 5 refs. AD-6471.

DESCRIPTORS: Submarines, *Electronic equipment, *Printed circuits, Production.

A review is presented of a study of existing materials, techniques, and equipment which are immediately suitable for the automatic production of electronic subassemblies. This study indicated that the difficulty of designing, installing, and operating a fully mechanized production line for processing printed circuits is a function of the dimensions of the basic materials and the complexity of the circuits to be printed on them. The dimensions of the basic material are especially important if the material is ceramic because the difficulty of maintaining close tolerances increases at a rapid rate as the size of the piece increases. The best results are secured if the piece size is reduced to a minimum. Block diagrams with over-all machinery requirements are included for a mechanized production line.

PB 160 722 $9.10

Vitro Labs., West Orange, N. J.
RELIABLE PREFERRED SOLID-STATE FUNCTIONAL DIVISIONS, by F. M. Medley, R. B. Naugle and others. Technical rept. on Contract AF 30(602)1906. 15 Dec 59, 104p. 1 ref. KLX-10177; RADC-TR-59-243; AD-254 184.

DESCRIPTORS: *Electronic equipment, *Solid state physics, Reliability, *Electronic circuits, *Semiconductors, Germanium, Silicon, Design, Amplifiers, Packaged circuits.

An investigation was made of ground electronic equipment to predict the number and types of high incident electronic functions which will be used from 1963 to 1968. A determination was made of those functions where the reliability can be increased by using solid-state design. The investigation was divided into 2 phases: (1) a survey for Air Force ground electronic equipment to determine electronic functional divisions, and (2) designation of a circuit design which satisfies the electronic functional divisions. All functional divisions that were analyzed can be constructed in solid-state form by using either germanium or silicon semiconductors.

PB 160 748-3 $3.60

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY, by R. R. Heikes, E. V. Somers, and S. J. Angello. Progress rept. no. 3 on Contract NObs-72361. 14 Apr 58, 33p. 13 refs. AD-215 961.

DESCRIPTORS: *Thermoelectricity, Electricity, Semiconductors, Electrical conductance, Thermodynamics, Thermal conductivity, Thermoelectric generators, Generators, Design

Contents:
Analysis of mixed valence materials, by R. R. Heikes

PB 160 748-4 $3.60

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY, by P. E. Snyder, E. V. Somers and others. Progress rept. no. 4 on Contract NObs-72361. 13 May 58, 37p. 12 refs. AD-215 962.

DESCRIPTORS: *Thermoelectricity, Electricity, Material, Preparation, Semiconductors, Transition elements, Intermetallic compounds, Powder metallurgy, Sintering, Single crystals, Crystals, Thermoelectric generators, Generators, Design.

Contents:
Preparative techniques for mixed valence materials, by P. E. Snyder

PB 160 748-5 $9.10

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY, by W. A. Tiller. Progress rept. no. 5 on Contract NObs-72361. 23 June 58, 106p. 42 refs. Research memo. 431FD211-M1; Research repts. 431FD281-R1-X; 431FD275-R1, and Scientific paper 431FD112-P1; AD-216 016.

DESCRIPTORS: *Thermoelectricity, Electricity, Crystals, Growth, Thermal diffusion, Diffusion, Electrons, Electron transitions, Thermoelectric generators, Generators, Simulation, Materials, Zinc, Metals, Oxides, Phase studies, Solids, Alloys, Zone melting.

Contents:
Crystal growth, by W. A. Tiller
Thermal diffusion in thermoelectric elements, by P. Shawmon
Studies of polaron motion I. The molecular-crystal model, by T. Holstein (Research memo 431FD211-M1)
Measurement of thermoelectric materials under simulated generator conditions, by S. J. Angello and C. S. Duncan (Research rept. 431FD281-R1-X)
Zinc in metal oxides, by R. J. Nadalin (Research rept. 431FD275-R1)
The use of controlled solidification in equilibrium diagram studies, by W. A. Tiller (Scientific paper 431FD112-P1)

PB 160 748-6 $6.60

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY, by R. W. Ure, Jr., J. P. McHugh, and W. A. Tiller. Progress rept. no. 6 on Contract NObs-72361. 30 July 58, 61p. 46 refs. Scientific paper 431FD271-P1; AD-215 963.

DESCRIPTORS: *Thermoelectricity, Electricity, *Thermoelectric generators, Generators, Semiconductors, Bismuth alloys, Tellurium alloys, Selenium alloys, Intermetallic compounds, Phase studies.

Contents:
Use of classical semiconductors in thermoelectric devices, by R. W. Ure, Jr.
Solid-liquid phase equilibria in pseudo-binary systems Bi_2Te_3-Bi_2Se_3 by J. P. McHugh and W. A. Tiller (Scientific paper 431FD271-P1)

PB 160 748-7 $4.60

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY. Progress rept. no. 7 on Contract NObs-72361. 31 Aug 58, 50p. 25 refs. Research memo. 431FD279-M1(412); Research rept. 431FD282-R1; AD-217 227.

DESCRIPTORS: *Thermoelectricity, Electricity, Materials, Indium alloys, Antimony alloys, Arsenides, Intermetallic compounds, Semiconductors, Electrical conductance, Thermal conductivity, *Thermoelectric generators, Generators, Design.

Contents:
Calculation of the efficiency of a thermoelectric device, by B. Sherman (Research memo. 431FD279-M1(412)
InAs and InSb as thermoelectric materials, by R. Bowers, R. W. Ure, Jr. and others
Optimization of a conventional-fuel-fired thermoelectric generator, by B. W. Swanson and E. V. Somers (Research rept. 431FD282-R1)

PB 160 748-8 $8.60

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY, by W. A. Tiller, H. A. Johansen, and T. Holstein. Progress rept. no. 8 on Contract NObs-72361. 1 Oct 58, 97p. 31 refs. Scientific papers 431FD272-P1 and 431FD270-P3; Research memo. 403FD211-M2; AD-215 964.

DESCRIPTORS: *Thermoelectricity, Electricity, Semiconductors, Alloys, Crystals, Growth, Refractory materials, Preparation, Electric furnaces, Electric arcs, Electrons, Electron transitions.

Contents:
Alloy crystal growth, by W. A. Tiller (Scientific paper 431FD272-P1)
Arc furnace preparation of refractory compounds, by H. A. Johansen (Scientific paper 431FD270-P3)
Studies of polaron motion II. The "small" polaron, by T. Holstein (Research memo. 403FD211-M2)

PB 160 748-9 $4.60

Westinghouse Research Labs., Pittsburgh, Pa.
THERMOELECTRICITY, by B. W. Swanson, E. V. Somers, and S. J. Angello. Progress rept. no. 9 on Contract NObs-72361. 17 Oct 58, 45p. 6 refs. Research repts. 431FD282-R4-X and 414FD307-R1; AD-216 680.

DESCRIPTORS: *Thermoelectricity, Electricity, *Thermoelectric generators, Generators, Design.

Contents:
Optimization of the available power and power density of a fuel-fired thermoelectric generator, by B. W. Swanson and E. V. Somers (Research rept. 431FD282-R4-X)
Design procedure for thermoelectric power generators, by Stephen J. Angello (Research rept. 414FD307-R1)

Mechanical Engineering

DC-59-6-253 $2.60

General Electric Co., Cincinnati, Ohio.
PRELIMINARY DESIGN: A SYSTEM FOR CONTINUOUSLY HEATING 0.2 LB/SEC OF CLEAN AIR TO 3100°F, by S. E. Eckard. Preliminary rept. on Contract AT(11-1)-171. 18 June 59, 21p.

TID-15016 $8.10

Purdue U. School of Mechanical Engineering, Lafayette, Ind.
COMBINED FORCED AND FREE TURBULENT CONVECTION IN A VERTICAL TUBE, by M. S. Ojalvo and R. J. Grosh. Technical rept. no. 12 on Contract AT(11-1)-1026. Jan 62, 84p. 62 refs.

Ordnance, Missiles, and Satellite Vehicles

NASA N62-13827 $1.10

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
INFLUENCE OF DRAG DURING BOOST ON ROCKET VEHICLE PERFORMANCE, Alan D. Levin. 1962. 9p. 2 refs.

NASA N62-12506 $2.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
PILOTED SIMULATION STUDIES OF RE-ENTRY GUIDANCE AND CONTROL AT PARABOLIC VELOCITIES, by Rodney C. Wingrove and Robert E. Coate. 1961, 27p. 12 refs.

NASA N62-13106 $4.60

Astrophysical Observatory, Smithsonian, Institution, Cambridge, Mass.
SATELLITE ORBITAL DATA, NO. E-1, by I. C. Izsak. Rept. on Grant NsG-87-60. 23 Apr 62. 35p. SAO special rept. 92.

NASA N62-12491 $2.60

Dunlap and Associates, Inc., Stamford, Conn.
INFORMATION REQUIREMENTS FOR SPACE NAVIGATION. Quarterly progress rept. no. 2, 1 Jan-1 Apr 62, on Contract NASr-64. 31 Mar 62, 23p. 5 refs. Tech. rept. 61.55-2.

PB 160 740 $19.75

Electro-Optical Systems, Inc., Pasadena, Calif.
RADIATOR-CONDENSER FOR SPACE ENVIRONMENT, by Alan M. Haire, Lance G. Hays, and Joseph L. Collins. Final rept. 1 May 59-30 Sep 60, on Contract AF 33(616)6520. 31 Oct 60, 328p. 112 refs. EOS rept. 310, final; WADD-TR-61-20; AD-253 791.

DESCRIPTORS: *Power supplies, Condensation, *Space environmental conditions, Spaceships, *Heat transfer, Satellite vehicles, Tests, *Power plants, Heat exchangers, Mercury, Vapors, Cooling, Design

A radiator-condenser (R-C) for a Rankine cycle space power system was designed to condense and subcool superheated mercury vapor. A test model R-C, designed to reject approximately 1 kw of heat, was tested in a closed loop laboratory system over a range of vapor inlet temperatures from 810 F to 964 F. Both wet and superheated vapor conditions were used. Flow rates were adjusted over a range of values at each inlet temperature in order to move the vapor-liquid interface from a position near the R-C outlet manifold to a position near the inlet manifold. The results demonstrated that a curved tube R-C can be used to condense mercury vapor in a space power system over a relatively wide range of operating conditions. Performance of the R-C demonstrated the validity of the design method, except that measured pressure drops were considerably lower than those predicted by currently available analytical methods. (Author)

NASA N62-12596 $2.60

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
APPLICATION OF MODULARIZATION CONCEPT TO SATELLITE TAPE RECORDERS, by P. T. Cole, H. J. Peake, and C. F. Rice. 1962, 26p. 1 ref.

NASA N62-13860 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TEMPERATURE-CONTROL ENGINEERING OF A NUCLEAR-ELECTRIC SPACECRAFT, by J. J. Volkoff. Rept. on NASA Contract NAS7-100. 15 May 62. 25p. 8 refs. Rept. JPL TR-32-232.

NASA N62-13086 $1.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EDUCATIONAL REQUIREMENTS FOR AEROSPACE STRUCTURES RESEARCH, by R. R. Heldenfels. 1962, 18p. 1 ref.

NASA N62-12965 $2.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TRAJECTORY CONSIDERATIONS FOR THE RETURN TO EARTH PHASE OF LUNAR MISSIONS, by J. P. Gapcynski and R. H. Tolson. 1962, 28p. 1 ref.

NASA N62-12478 $6.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
AN ELECTROSTATIC PROPULSION SYSTEM WITH A DIRECT NUCLEAR ELECTRO-GENERATOR, by Charles A. Low, Jr. and William R. Mickelsen. 1962, 68p. 28 refs.

NASA N62-13897 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
PERFORMANCE EVALUATION OF FIXED- AND VARIABLE-AREA ROCKET EXHAUST DIFFUSERS USING SINGLE AND CLUSTERED NOZZLES WITH AND WITHOUT GIMBALING, by Bruce E. Church, William L. Jones, and Richard J. Quentmeyer. July 62. 33p. 6 refs. Rept. NASA TN D-1306.

NASA N62-13825 $4.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
THEORETICAL AND EXPERIMENTAL ANALYSIS OF SEVERAL TYPICAL JUNCTIONS IN SPACE VEHICLE SHELL STRUCTURES, by Robert H. Johns, William C. Morgan, and David A. Spera. 1962. 42p. 11 refs.

NASA N62-13773 $2.00

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
CONCEPTUAL DESIGN STUDY OF A MULTIPURPOSE AEROSPACE TEST FACILITY, by Raymond W. Moore, Jr., R. Donald Biron, and Arthur A. Fowle. NASA Contract NAS8-1538. July 62. 76p. 8 refs. Rept. NASA TN D-1273.

NASA N62-13889 $1.00

Marshall Space Flight Center, Huntsville, Ala. National Aeronautics and Space Administration.
LUNAR STORAGE OF LIQUID PROPELLANTS, by W[illiam] E. Dempster, R. L. Evans, and J. R. Olivier. July 62. 41p. 4 refs. Rept. NASA TN D-1117.

NASA N62-12963 $1.60

Michigan U., Ann Arbor.
COMPLETION OF CORRECTIVE MEASURES ON NIKE-CAJUNS 10.90 AND 10.91 UA, by Edward J. Schaefer. Quarterly progress rept. no. 9, 1 Dec 61-28 Feb 62, on Contract NASw-138. 27 Apr 62. 11p. Rept. 03598-9-P.

NASA N62-13719 $3.60

MSA Research Corp., Callery, Pa.
EXPLORATORY STUDY OF POTASSIUM AND SODIUM SUPEROXIDE FOR OXYGEN CONTROL IN MANNED SPACE VEHICLES, by C. A. Palladino, R. A. Spencer, and D. J. Kunard. Quarterly progress rept. no. 7, Jan 61-Mar 61, on NASA Contract NASw-90. 17 May 61. 34p. refs. Rept. MSAR-61-22.

NASA N62-13720 $1.60

MSA Research Corp., Callery, Pa.
EXPLORATORY STUDY OF POTASSIUM AND SODIUM SUPEROXIDE FOR OXYGEN CONTROL IN MANNED SPACE VEHICLES, by C. A. Palladino and D. J. Kunard. Quarterly progress rept. no. 8, Apr-June 61, on NASA Contract NASw-90. 19 July 61. 16p. 3 refs. Rept. MSAR-61-79.

NASA N62-13320 $6.60

National Aeronautics and Space Administration, Washington, D. C.
AN APPEAL TO UNSHACKLE LAUNCH VEHICLE THINKING WITH A DEMONSTRATION EARTH/LUNAR DIRECT-FLIGHT VEHICLE CONCEPT, by William J. D. Escher. 3 Oct 61, 61p.

NASA N62-13808 $1.10

National Aeronautics and Space Administration, Washington, D. C.
COMMUNICATIONS SATELLITES: STATEMENT TO THE COMMITTEE ON AERONAUTICAL AND SPACE SCIENCES, U. S. SENATE, by Hugh L. Dryden. 1962. 10p.

PB 160 742 $12.50

Office of Scientific Research and Development. Div. 6.
SEARCH AND SCREENING, by Bernard Osgood Koopman (Columbia U. Div. of War Research). Summary technical rept. vol. 2B, on Contract OEMsr-1131. 1946, declassified, 178p. Operations Evaluation Group rept. no. 56; AD-214 252.

DESCRIPTORS: *Operations research, *Targets, *Detection, Visibility, Visual perception, *Search radar, Sonar, *Sonar equipment, Radio sono buoys, Echo ranging, Motion, Probability, Display systems

Contents:
Position, motion, and random encounters
Target detection
The distribution of searching effort
Visual detection
Radar detection
Sonar detection
The search for targets in transit
Sonar screens
Aerial escort
Glossary
Index

PB 160 687 $2.60

Ordnance Mission, White Sands [Missile Range] N. Mex.
TABLES FOR COMPUTING RADIAL PROBABILITY, by Paul C. Cox, John W. Coy, and Charles Johnson. Jan 58, 27p. 1 ref. Technical memo. no. 491; AD-152 877.

DESCRIPTORS: Statistical processes, *Tables, *Probability, *Terminal ballistics, Ballistics, Data.

Techniques are discussed for determining the probability of a round impacting within a circle of given radius if the range and azimuth components of the miss distance are normally distributed and uncorrelated, have a center of impact at the target, and have known standard deviations. Tables for these values are computed. Tables for computing the probability of an air burst within a sphere of a given radius are also included for the simple 3-dimensional case in which standard deviations are equal.

NASA N62-13140 $2.60

Rand Corp., Santa Monica, Calif.
ON THE MOTION OF ECHO 1-TYPE EARTH SATELLITES, by L. N. Rowell, M. C. Smith, and W. L. Sibley.Rept. on Contract NASr-21(02). May 62, 27p. 4 refs. Memorandum RM-3185-NASA.

NASA N62-13726 $1.10

Rand Corp., Santa Monica, Calif.
STABILITY AND DYNAMIC-LOAD EQUATIONS OF BOOST VEHICLES, by D. G. B. Edelen. Quarterly status rept., 15 June-15 Sep 61, on Contract NASr-21(03). 1p.

PB 160 730 $5.60

RCA Service Co. [Patrick AFB, Fla.]
USE OF SATELLITES FOR RELAYING RADIO SIGNALS BETWEEN LOW ALTITUDE MISSILES AND GROUND INSTRUMENTATION STATIONS, by Louis C. Hayden, Jr. Rept. on Missile Test Proj. 1 Dec 58, 53p. RCA Systems rept. no. 118; AFMTC-TR-58-25; AD-227 802.

DESCRIPTORS: * Satellite vehicles, *Guided missiles, *Radio signals, *Radio relay systems, Radio waves, Propagation, Telemetering, Information theory, Communication systems, *Ground support equipment.

The use of satellites for relaying radio signals from low altitude global missiles and satellites is discussed This is considered as a possible means of maintaining continuous communications with such vehicles from a relatively small number of ground-based stations. The geometry is examined to determine the number of satellites and their height necessary to provide continuous communications. This determines the maximum ranges over which the signals must be propagated. The required radiated powers are calculated at various frequencies for standard FM/FM telemetry signals and for an arbitrarily assumed remote control system. It is found that those signals require larger transmitter powers than are feasible. Information theory is applied to received signal powers resulting from reasonable transmitter powers. A measure of possible information capacities for the missile-satellite links is thus obtained.

NASA N62-13770 $8.60

Space Technology Labs., Inc., Los Angeles, Calif.
AN ANALYSIS OF MOON-TO-EARTH TRAJECTORIES, by P. A. Penzo. 30 Oct 61. 94p. 6 refs. Rept. no. 8976-0008-RU-000.

NASA N62-13141 $1.60

Stanford Research Inst., Menlo Park, Calif.
INVESTIGATION OF THE SPACE STORABILITY OF PRESSURIZING GASES, by R. F. Muraca. Monthly status rept. no. 2, 18 Mar-20 Apr 62, on Contract NAS7-105. 27 Apr 62, 11p.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

Food

NYO-9575 $3.60

Massachusetts Inst. of Tech., Cambridge.
A STUDY OF THE EFFECTS OF SUBSTERILIZATION DOSES OF RADIATION ON THE STORAGE LIFE EXTENSION OF SOFT SHELLED CLAMS AND HADDOCK FILLETS, by John T. R. Nickerson, Samuel A. Goldblith, and Edmund B. Masurovsky. Quarterly progress rept. Feb-Apr 62, on Contract AT(30-1)-2329. 38p. 60 refs.

OTS SB-403, Revised $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
FOOD PRESERVATION BY IRRADIATION. May 62, 11p. 185 refs. OTS Selective Bibliography SB-403, revised.

DESCRIPTORS: *Food, *Preservation, Radiation effects, *Bibliography, Toxicity, Packaging, Storage, Pasteurization.

Lists 185 reports and translations on food preservation by irradiation added to the OTS collection through May 1962. Includes information on sterilization, pasteurization, toxicity, packaging, storage life, and food irradiation facilities, as well as modifications of flavor, color, and texture. (Author)

OTS SB-412, Suppl. 1 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
FOOD PRESERVATION (EXCEPT BY IRRADIATION). May 62, 8p. 91 refs. OTS Selective Bibliography SB-412, suppl. 1.

DESCRIPTORS: *Food, Preservation, Pasteurization, Dehydration, Freeze-drying, Freezing, Bibliography.

Lists 91 domestic and foreign references on food preservation by processes other than irradiation added to the OTS collection June 1960 through May 1962. Includes reports and translations on food preservation by sterilization, pasteurization, biochemical treatment, smoke-curing, salt-curing, dehydration, freeze-drying, freezing, refrigerating, etc. Reports and translations on food preservation by irradiation are listed in Selective Bibliography SB-403. (Author)

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

PB 181 294 $0.50

Williams, Clyde and Co., Columbus, Ohio.
RADIOISOTOPES IN INDUSTRIAL COST AND QUALITY CONTROL, by Robert E. Greenlee and William H. Bickley. Rept. on Contract CC 4569. [1961] 11p. 28 refs.

DESCRIPTORS: *Radioactive isotopes, Industrial research, Manufacturing methods, *Costs, *Quality control, Industry.

An evaluation of commercial applications.

Engines and Propulsion Systems

DC-60-12-129 $1.60

General Electric Co., Cincinnati, Ohio.
ALTERNATE FASTENER SURVEY, by A. D. Feith. Preliminary rept. on Contract AT(11-1)-171. 27 Dec 60, 15p.

NASA N62-12914 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A SUPERCONDUCTING CYCLIC FLUX PUMP, by Daniel D. Elleman, Alvin F. Hilderbrandt and others. 1962, 6p. 2 refs.

NASA N62-13223 $1.60

Kelsey-Hayes Co., Romulus, Mich.
IN-FLIGHT GENERATION OF FUEL FOR CESIUM ION ENGINES; THE CESIUM HYDRIDE SYSTEM, by Ernest N. Petrick, John A. Clark, and James C. Carter. Rept. on NASA Contract NAS8-1616. 1962, 12p. 20 refs.

NASA N62-13251 $7.60

Kelsey-Hayes Co., Romulus, Mich.
PROPELLANT FEED SYSTEMS FOR ION ENGINES: THE CESIUM HYDRIDE SYSTEM, by E. N. Petrick, J. C. Carter, J. J. Krauss, and S. F. Watanabe. Summary rept. on NASA Contract NAS8-1616. 15 Feb 62. 71p. 35 refs.

Machine Parts and Mechanisms

DC-60-1-37 $5.60

General Electric Co., Cincinnati, Ohio.
D-103 BY-PASS VALVE BEARING DEVELOPMENT, by R. K. Fagley. Final rept. on Contract AT(11-1)-171. 6 Jan 60, 53p.

TID-16105 $3.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
THE APPLICATION OF GAS LUBRICATED BEARINGS TO HIGH SPEED TURBO MACHINERY, by M. W. Eusepi, A. Marmarou, and D. D. Fuller. Quarterly progress rept. 1 Dec 61-28 Feb 62, on Contract AT(30-1)-2512. 35p. Q-A2392-3-4.

NASA N62-13716 $2.60

Marlin-Rockwell Corp., Jamestown, N. Y.
METHOD OF PRODUCING IMPROVED BEARING COMPONENTS BY ELIMINATION OR CONTROL OF FIBER ORIENTATION, INCLUDING MAGNETIC ANALYSIS, by D. R. Wensing, J. E. Langfeldt, and S. Hujber. Quarterly rept. no. 7 on Contract NASw-72. 20 Mar 61. 23p.

NASA N62-13717 $1.10

Marlin-Rockwell Corp., Jamestown, N. Y.
METHOD OF PRODUCING IMPROVED BEARING COMPONENTS BY ELIMINATION OR CONTROL OF FIBER ORIENTATION, INCLUDING MAGNETIC ANALYSIS, by D. R. Wensing and S. Hujber. Quarterly rept. no. 8 on Contract NASw-72. 7 Aug 61. 6p.

MATERIALS

PB 181 353 $0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
THE SIGNIFICANCE OF THE CONSTANTS OF THE DETERGENCY-SOLUBILIZATION FUNCTION, by A. Mankowich. 10 May 62, 11p. 5 refs. Rept. no. CCL #119.

DESCRIPTORS: *Detergents, Tests, Solubility, Wetting agents, Colloids, Dyes, Metallic soaps, Oleic acids, Laurates, Alcohols, Ethylenes, Oxides, Amines, Ethers, Glycols, Phenyl radicals, Soils, Surface tension, Surface properties.

The significance of the relationship of the linearity constants of a previously reported detergency-micellar solubilization function (1) to surfactant HLB (hydrophile-lipophile balance), boundary tensions, and soil dipole moment has been extended by demonstrating the existence of the connection in "four soil-one surfactant" and "one soil-four surfactant" systems. (Author)

NASA N62-13757 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
MEASUREMENT OF TOTAL NORMAL EMITTANCE OF BORON NITRIDE FROM 1,200° F TO 1,900° F WITH NORMAL SPECTRAL EMITTANCE DATA AT 1,400° F, by Gilbert H. Walker and Francis W. Casey, Jr. July 62. 22p. 2 refs. Rept. NASA TN D-1268.

NASA N62-12966 $1.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A METHOD FOR MEASURING THE SPECTRAL NORMAL EMITTANCE IN AIR OF A VARIETY OF MATERIALS HAVING STABLE EMITTANCE CHARACTERISTICS, by Wayne S. Slemp and William R. Wade. 1962, 17p. 3 refs.

PB 181 360 $4.00

Quartermaster Research and Engineering Command, Natick, Mass.
BLEND FABRICS AND THEIR IMPACT ON MILITARY TEXTILE APPLICATIONS, ed. by Stanley Backer Mass. Inst. of Tech.), Frank R. Fisher (National Academy Sciences), and Louis I. Weiner. Rept. on Conference on Military Applications of Blended Fabrics, May 17-18, 1960. 1961, 251p. 83 refs. Textile Series rept. no. 119.

DESCRIPTORS: *Textiles, Mechanical properties, Cellulose, Wool, *Clothing, Manufacturing methods, *Fibers, Military requirements, Synthetic fibers

Contents:
Technical Session No. 1
Some Effects of Blend on Structure
Characteristics and Changes in Mechanical Properties of Fabrics of Cellulosic Blends
Influence of Blending on Properties of Wool-Type Fabrics
Technical Session No. 2
Ortho Mixtures
Texturing and Blending
Fabric Aesthetics in Staple Blends
Technical Session No. 3
Impact of Blends on Clothing Manufacture
Consumer Reactious to Fiber Blends
Panel Discussion, Dr. Stanley Backer Chariman
Application of Textile Fiber Blends in Army Uses
Technical Session No. 4
Fiber Combinations in Navy Fabrics
Application of Blends to Air Force Use
Marine Corps Experiences with Fiber Blends

ORO-551 $1.10

Southern Research Inst., Birmingham, Ala.
THE DETERMINATION OF THE TRUE STRESS-STRAIN PROPERTIES OF BRITTLE MATERIALS TO 5000°F. Monthly progress rept. no. 9 on Contract AT(40-1)-2694. 17 May 62, 4p.

PB 181 296 $0.50

Williams, Clyde and Co., Columbus, Ohio.
POLYMETRIC COMPOUNDS TO IMPROVE THE HOLDING POWER OF WOOD FASTENERS, by Robert E. Greenlee and William A. Losoncy, Jr. Rept. on Contract CC 4569. [1961] 15p. 6 refs.

DESCRIPTORS: Materials, *Polymers, Resins, *Wood, Bolts, Lubricants, Manufacturing methods, Clamps.

An evaluation of commercial applications.

Ceramics and Refractories

AD-277 152 repriced $1.75

Advanced Metals Research Corp., Somerville, Mass.
RESEARCH TO DETERMINE THE COMPOSITION OF DISPERSED PHASES IN REFRACTORY METAL ALLOYS, by Frank B. Cuff, Jr. Rept. for 15 Nov 60-30 Nov 61, on Contract AF 33(616)7671. Apr 62, 65p. 4 refs. ASD-TDR-62-7.

DESCRIPTORS: *Heat resistant alloys, *Molybdenum alloys, *Niobium alloys, Electron diffraction analysis, X-ray diffraction analysis, Thermodynamics, Phase studies, Diffusion, Microstructure, Lattices, Carbides, Refractory materials.

The composition, structures and lattice parameters of the precipitates in two Mo-base and two Nb-base alloys have been determined using the electron microbeam probe and x-ray and electron diffraction techniques. In general the precipitates were found to be complex carbides which, in some cases, could be explained on the bases of known phase relationships and thermodynamic data. The deviations of lattice parameters from those of pure carbides could be explained on the basis of atom substitution. (Author)

NASA N62-13112 $1.60

Boston U., Mass.
BUBBLE DISTRIBUTION IN FUSED OBSIDIAN AND SLIDE GLASS, by Badri Aghassi. Research rept. no. 12 on Tektite Project, Grant NsG-21-59. 1962, 17p. 1 ref. Astronomical Contribution of Boston U., Series 11, no. 14.

DC-60-3-110 $3.60

General Electric Co., Cincinnati, Ohio.
AN APPARATUS FOR EVALUATING THE THERMAL STRESS RESISTANCE OF VARIOUS HIGH TEMPERATURE MATERIALS, by F. M. Donovan. Preliminary rept. on Contract AT(11-1)-171. 11 Mar 60, 31p.

DC-60-12-158 $1.10

General Electric Co., Cincinnati, Ohio.
CREEP RATE OF SOME THERMAL INSULATING MATERIALS UNDER 100 PSI LOAD AT 2100°F HOT FACE TEMPERATURE, by S. E. Eckard. Preliminary rept. on Contract AT(11-1)-171. 2 Dec 60, 10p.

DC-59-4-106 $2.60

General Electric Co., Cincinnati, Ohio.
PRELIMINARY CALCULATIONS ON PLATE OUT OF Al_2O_3 FROM $AlCl_3$, H_2, CO_2, VAPOR, by G. R. Van Houten. Preliminary rept. on Contract AT(11-1)-171. 9 Apr 59, 27p.

TID-15382 $2.60

Smith, A. O., Corp., Milwaukee, Wis.
EQUILIBRIUM STUDIES OF REFRACTORY METAL OXIDES, by L. J. Fiegel, G. P. Mohanty, and J. H. Healy. Rept. 13 June 61-13 Jan 62, on Contract AT(11-1)-1048. 7 Mar 62, 23p. 15 refs. LRR-36.

TID-14302 $1.60

Washington State U., Pullman.
PARTICULATE CONTAMINATION FROM GLASS, by E. E. Donaldson. 4 Dec 61, 13p. 8 refs.

Fuels, Lubricants, and Hydraulic Fluids

PB 160 732-1 $10.50

Monsanto Chemical Co., Everett, Mass.
EVALUATION OF HIGH TEMPERATURE HYDROCARBON FUELS. PART I. LITERATURE SEARCH AND LIST OF RECOMMENDED HYDROCARBONS. VOLUME I, by Stanley D. Koch, Robert M. Kliss, and John O. Smith. Final rept., pt. 1, vol. 1, 11 June 58-1 May 59, on Contract AF 33(616)5799. May 59. 140p. 1300 refs. WADC Technical rept. 59-327, Part I, Vol. 1; AD-232 479.

DESCRIPTORS: *Fuels, *Hydrocarbons, Bibliography, Combustion, Indexes, Punched card methods, Physical properties, *Jet engine fuels, *Rocket fuels, Pyrolysis, Stability, Temperature.

This work was initiated in order carefully to examine existing hydrocarbons and their analogs to find and recommend pure hydrocarbons which would have improved thermal stability without sacrifice of heat of combustion or of other desirable characteristics. The literature search uncovered about six thousand hydrocarbons of interest. They are saturated polycyclics and the olefins and aromatic precursors from which they might be prepared. The results of the search are tabulated in Appendix VII and on a deck of punched IBM cards. The deck of punched cards can be mechanically reproduced. The list of fifty candidate fuels was chosen as a result of a careful examination of the literature search. The candidate fuels are divided into three groups: thirty compounds which are commercially feasible and which have highest heat of combustion per pound, five commercially feasible compounds of high heat of combustion per gallon, and fifteen compounds of unique or extraordinary structure which might warrant investigation. (Author)

PB 160 732-2 $15.00

Monsanto Chemical Co., Everett, Mass.
EVALUATION OF HIGH TEMPERATURE HYDROCARBON FUELS. PART I. LITERATURE SEARCH AND LIST OF RECOMMENDED HYDROCARBONS. VOLUME II, by Stanley D. Koch, Robert M. Kliss, and John O. Smith. Final rept., pt. 1, vol. 2 [on Contract AF 33(616)5799]. May 59, 224p. WADC Technical rept. 59-327, Part I, Vol. 2; AD-232 480.

DESCRIPTORS: *Fuels, *Jet engine fuels, *Rocket fuels, Bibliography, Indexes, Punched card methods, Physical properties, Pyrolysis, Stability, Temperature, *Hydrocarbons, Combustion.

Contains beginning of Appendix VII (Tabulation of properties and structures of the compounds). (See also PB 160 732-1)

PB 160 732-3 $15.00

Monsanto Chemical Co., Everett, Mass.
EVALUATION OF HIGH TEMPERATURE HYDROCARBON FUELS. PART I. LITERATURE SEARCH AND LIST OF RECOMMENDED HYDROCARBONS. VOLUME III, by Stanley D. Koch, Robert M. Kliss, and John O. Smith. Final rept., pt. 1, vol. 3 [on Contract AF 33(616)5799]. May 59, 223p. WADC Technical rept. 59-327, Part I, Vol. 3; AD-232 481.

DESCRIPTORS: *Fuels, *Jet engine fuels, *Rocket fuels, Bibliography, Indexes, Punched card methods, Physical properties, Pyrolysis, Stability, Temperature, *Hydrocarbons, Combustion.

Contains a continuation of Appendix VII (Tabulation of properties and structures of the compounds). (See also PB 160 732-2)

PB 160 732-4 $14.50

Monsanto Chemical Co., Everett, Mass.
EVALUATION OF HIGH TEMPERATURE HYDROCARBON FUELS. PART I. LITERATURE SEARCH AND LIST OF RECOMMENDED HYDROCARBONS. Volume IV, by Stanley D. Koch, Robert M. Kliss, and John O. Smith. Final rept., pt. 1, vol. 4 [on Contract AF 33(616)5799]. May 59, 215p. WADC Technical rept. 59-327, Part I, Vol. 4; AD-232 482.

DESCRIPTORS: Fuels, *Jet engine fuels, *Rocket fuels, Bibliography, Indexes, Punched card methods, Physical properties, Pyrolysis, Stability, Temperature, *Hydrocarbons, Combustion.

Contains the conclusion of Appendix VII (Tabulation of properties and structures of the compounds). (See also PB 160 732-3)

PB 181 359 $0.50

Rock Island Arsenal Lab., Ill.
THE EFFECT OF VAPOR DEGREASING ON WEAR LIFE AND SALT SPRAY LIFE OF RESIN-BONDED SOLID FILM LUBRICANTS, by G. P. Murphy and F. S. Meade. 20 Feb 62, 20p. 2 refs. Rept no. 62-652.

DESCRIPTORS: *Coatings, *Corrosion, *Lubricants, Lubrication, Vapors, Films, Epoxides, Vinyl chlorides, Aerosols, Salinity, Life expectancy, Reduction.

Two resin-bonded solid film lubricants were applied to anodized aluminum and zinc phosphatized steel tests specimens. The effect of degreasing and combination of degreasing and salt spray exposure on the wear life of the coatings was determined on a Falex Lubricant Tester. Vapor degreasing for periods in excess of ten minutes decreased the salt spray protection provided by the solid film lubricant. Vapor degreasing for periods up to one hour has no deleterious effect on the wear of solid film lubricants. Vapor degreasing followed by salt spray exposure has no effect on the wear life of solid film lubricants applied over sealed anodized aluminum. If the anodized film is not sealed, vapor degreasing followed by salt spray exposure produces a drastic reduction in the wear life. (Author)

Paints and Finishes

PB 160 724-1 $2.60

Paint Lab., Mare Island Naval Shipyard, Vallejo, Calif.
ON THE ADHESION OF SARAN TO GALVANIZED MILD STEEL. PART I. THE ADHESION METHOD, by D. H. Smith, Jr. Rept. for 23 Mar-15 Sep 55. 15 Nov 55, 30p. Research and development rept. no. 55-4; Mare Island Test nos. 337 and 350.

DESCRIPTORS: *Paints, Films, *Adhesion, *Steel, *Zinc coatings, Surfaces, Test methods.

A satisfactory method for comparing the adhesion of paints (especially Buships Formula 117 and Saran) has been developed. The two edges of a one-half inch strip are cut simultaneously with a precision film cutter. The film cutter consists of a sled holding two knives, a track for the sled to run in, and a panel holder. Irregular panels of both surface and area are quickly accommodated. The strips are started with a starting tool. The panel is placed in a panel holder in the bottom jaw of the Standard Tinius Olson Electromatic Tensile Machine and the "started" end of the strip is placed in the upper jaw. The adhesion is traced in pounds per half inch directly on the standard chart. The adhesion characteristics are accurately reproduced in the form of a continuous curve. It is a reproduceable method. Errors within the technique are extremely small. Small differences stand out as well as large differences. Not only does it produce a reliable average adhesion result, but it also shows the spread from panel to panel, strip to strip, and even the spread on one test strip alone. Several variables can be analyzed and evaluated at one time. (Author)

PB 160 724-2 $4.60

Paint Lab., Mare Island Naval Shipyard, Vallejo, Calif.
ON THE ADHESION OF SARAN TO GALVANIZED MILD STEEL. PART II: THE PRIMER STUDY, by D. H. Smith, Jr. Rept. for 23 Mar-9 Nov 55. 6 Dec 55, 43p. Research and development rept. no. 55-5; Mare Island Test nos. 337 and 350.

DESCRIPTORS: *Paints, Films, *Adhesion, *Steel, *Zinc coatings, Surfaces, *Paint primers.

The purpose of this report is to compare the effect of the chrome pickle process to other suggested primer systems on the adhesion of Saran to galvanized surfaces. The Primer Study consists of four paint systems and one surface contaminate applied on an untreated galvanized surface and on a chrome pickled galvanized surface. The four paint systems are: (1) 117, 119, and 113/49, (2) 117 and 113/49, (3) 113/49 and (4) 119 and 113/49. The surface contaminate is the flux in solution from the standard galvanizing process. The adhesion of these paints was evaluated by the adhesion method (PB 160724-1). The chrome pickle treatment of galvanized mild steel greatly increases the adhesion of Saran over any other situation tested. It is eight to ten times greater than Saran over an untreated galvanized surface. The use of 117 under Saran produced the best results on an untreated galvanized surface with a value of 4.7 pounds per inch followed closely by the 117, 119 under Saran with a value of 4.4 pounds per inch. Orange Saran on untreated galvanize yields .75 pounds per inch while on a chrome pickled galvanized surface it yielded 12.3 pounds per inch. (Author)

Plastics

PB 160 727 $2.60

Houze Glass Corp., Point Marion, Pa.
RESEARCH AND DEVELOPMENT OF FIBER GLASS REINFORCED PLASTIC FOR PROPULSION SYSTEMS INERT COMPONENTS, by J. Frees Brossy. Quarterly progress rept no. 2, 15 Apr-15 July 59, on Contract NOrd-18701. 16 July 59, 22p. AD-225 051.

DESCRIPTORS: *Plastic tubing, Materials, Tests, *Laminates, *Glass textiles, Rocket cases.

A program was initiated to evaluate tubular, pre-impregnated, parallel glass fiber material which was developed previously. Hydrostatic and mechanical tests were conducted on 42 tubes 18 in. long and with inside diameters of 2.606 inches. Ring tensile tests were performed on tubes which had been tested hydrostatically by cutting 1/2-in. sections from the tubes near the point of break. The sections were placed in the split-ring test fixture in the Baldwin-Lima-Hamilton tensile tester, coated with grease, and tested to failure. Test ring thickness was determined to the nearest 0.001 in. at 2 opposite spots on the ring. Stresses were calculated after failure by the formulas: tensile stress = load/(2 x area); and hoop stress = (load x inside diameter)/(2 x circumferential wall thickness).

PB 160 714 $1.60

Naval Ordnance Lab., White Oak, Md.
IMPROVED REINFORCED PLASTICS WITH THE UNIVERSAL TYPE CHEMICAL FINISH, NOL 24, by P. Erickson and I. Silver. Rept. on High Strength Plastics. 12 Jan 55, 16p. 7 refs. NAVORD rept. 3889.

DESCRIPTORS: *Glass textiles, *Plastics, *Laminates, *Epoxy resins, *Phenolic resins, Finishes, Esters.

A new universal type chemical finish for glass fibers has been successfully applied on a pilot plant scale. Ultimate flexural strength from laminates with this finish on 181 style cloth was over 100,000 psi each with a polyester, epoxy and phenolic resin. (Author)

Rubber and Elastomers

PB 160 696 $2.60

Atlantic Research Corp., Alexandria, Va.
THE DEVELOPMENT OF FUEL-RESISTANT ARCTIC RUBBER. Final rept. 1 Oct 58-29 Feb 60, on Contract DA 44-009-eng-3733. [1960] 30p. AD-236 934.

DESCRIPTORS: *Polymers, Esters, Amides, Urethanes, Amines, Cyanates, Ethanols, *Elastomers, Synthesis, Fuels, *Synthetic rubber.

DESCRIPTORS: *Polymers, Esters, Amides, Urethanes, Amines, Cyanates, Ethanols, *Elastomers, Synthesis, Fuels, *Synthetic rubber.

Terpolymers containing ester, amide, and urethane groups as the components of the polymer molecule were synthesized to obtain rubbers characterized by elastomeric and fuel-resistant properties over the temperature range of -100°F to $+150^{\circ}$F. N-substituted dialkanolamines, diacids, triethanolamine, and diisocyanates were used as monomers to produce polymer chains having irregularly spaced ester, amide, and urethane groups. Disruption of orderly array of polymer units reduces or prevents crystallization and improves flexibility at low temperature. Molecular weight of the N-alkyl substituents of the N-alkyl diethanolamines were kept at a minimum to improve fuel resistance. A polyester prepared by condensing methyl diethanolamine, a mixture of C_{10} diacids and triethanolamine, when chain extended and cross-linked with hexamethylene diisocyanate yielded an elastomer which was flexible over the temperature range of -100°F to $+150^{\circ}$F. This elastomer is resistant to attack by aliphatic hydrocarbons. The cured polymer deteriorates after prolonged aging under ambient conditions, i.e., the polymer loses tensile strength and becomes soft and tacky. Proper compounding should eliminate this tendency. (Author)

NASA N62-13737 $6.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena
CROSSLINKED AND NON-CROSSLINKED DIISOCYANATE-LINKED ELASTOMERS CONTAINING SUBSTITUTED UREA GROUPS, by A. J. Havlik and Thor L. Smith. Rept. on NASA Contract NAS7-100 and Contract DA 04-495-ORD-18. 31 May 62. 62p. 110 refs. JPL-TR-32-180.

AD-270 947 $1.60

Quantum, Inc., Wallingford, Conn.
DEVELOPMENT OF TREATMENTS PRODUCING LOW-FRICTION SURFACES ON ELASTOMERS, by Robert M. Reihsmann. Quarterly progress rept. no. 3, 15 Aug-15 Nov 61, on Contract NObs-84503. [1961] 19p.

DESCRIPTORS: *Elastomers, Synthetic rubber, Butyl rubber, Nitriles, Fluorination, *Friction, Surfaces.

Work has been directed toward the development of a treatment for the Puget Sound Naval Shipyard Buna N stock No. B103. Satisfactory grafting procedures have been developed for Nitrile stocks in general. No satisfactory grafting procedure has, as yet, been found for butyl. The low speed coefficient of friction of the B103 compound has been reduced from a value greater than 2 (the upper limit of our low speed, 2.4 in/sec., tester) to a minimum of 0.41, while the high speed (114 in/sec.) coefficient of friction has been reduced to 0.18. Optimization of this treatment is currently being pursued to reduce surface hardening and surface cracking after flexing. (Author)

MATHEMATICS

AD-276 664 repriced $1.25

Naval Ordnance Lab., White Oak, Md.
ON A MIXED BOUNDARY VALUE PROBLEM FOR LINEAR HYPERBOLIC PARTIAL DIFFERENTIAL EQUATIONS IN TWO INDEPENDENT VARIABLES, by A. K. Aziz and J. B. Diaz. 2 Apr 62, 48p. 21 refs. Mathematics Dept. rept. M-19; NOLTR-61-32.

DESCRIPTORS: Equations, *Parital differential equations, Solutions, Series

Computing Devices

TID-15485 $5.60

Digital Computer Lab., U. of Illinois, Urbana.
HIGH SPEED COMPUTER PROGRAM (PART I). CIRCUIT RESEARCH PROGRAM (PART II). MATHEMATICAL METHODS (PART III). DATA REDUCTION METHODS (PART IV). ILLIAC USE AND OPERATION (PART V). IBM 650 USE AND OPERATION (PART VI). INSTRUCTIONAL USE OF COMPUTERS (PART VII). CONTROL DATA CORPORATION 1604 (PART VIII). GENERAL LABORATORY INFORMATION (PART IX). Technical progress rept. on Contract AT(11-1)-415. Feb 62, 58p.

TID-14479 $6.60

Digital Computer Lab., U. of Illinois, Urbana.
HIGH SPEED COMPUTER PROGRAM (PART I). CIRCUIT RESEARCH PROGRAM (PART II). MATHEMATICAL METHODS (PART III). DATA REDUCTION METHODS (PART IV). ILLIAC USE AND OPERATION (PART V). IBM 650 USE AND OPERATION (PART VI). INSTRUCTIONAL USE OF COMPUTERS (PART VII). GENERAL LABORATORY INFORMATION (PART VIII). Technical progress rept. on Contract AT(11-1)-415. Oct 61, 59p.

TID-15630 $3.60

Duquesne Light Co., Shippingport, Pa.
AUTOMATIC DATA LOGGING AND COMPUTING SYSTEM PERFORMANCE TEST. 23 Mar 62, 40p. DLCS 4000101 and T-641333.

AD-277 493 repriced $4.00

Melpar, Inc., Falls Church, Va.
A STUDY OF GENERALIZED MACHINE LEARNING, by E. B. Carne. Final rept. Dec 60-Jan 62, on Contract AF 33(616)7682. Apr 62, 255p. 104 refs. ASD-TDR-62-166.

DESCRIPTORS: *Digital computers, Computers, *Computer logic, *Learning, Special functions, Theory, Feedback, Control, Scheduling, Sequences, Games theory, Simulation, Circuits

Results of theoretical and simulation studies of generalized machine learning are presented. Two basic types of networks have been studied; the ARTRON networks, and the Self-Organizing Binary Logical Network. Individual results along with comparative results are given. The results of this study are as follows: machines are capable of learning; and machines may be constructed which learn efficiently, i.e., with minimum information required for learning. A description of a breadboard implementation along with results of some games is presented as proof-of-principle. (Author)

ORNL-TM-221 $1.10

Oak Ridge National Lab., Tenn.
A TRANSLATOR-ORIENTED INTERMEDIATE COMPUTER LANGUAGE, by A. A. Grau. 4 May 62, 4p.

MECHANICS

AD-274 650 repriced $1.25

CryoVac, Inc., Columbus, Ohio.
CRYOPUMPING BY THREE ARRAYS AT PRESSURES OF 10^{-3} TO 10^{-8} mm. Hg., by Carlisle B. Barnes, Jr and Charles B. Hood, Jr. Rept. on Subcontract to Contract AF 33(616)5102. Dec 61, 47p. 8 refs. ASD-TDR-62-15.

DESCRIPTORS: Gases, Condensation, *Cryogenics, Gas pumps, *Vacuum systems, Liquefied gases, Nitrogen, Ionization gages

Three arrangements of surfaces cooled to 21.5°K were investigated theoretically and tested to determine condensing rates and resultant vacuum pumping performance of the arrays at pressures of 10^{-3} to 10^{-8} mm Hg. These are identified as unshielded, flat shielded, and angled fin arrays. Theoretical performance and experimental performances were correlated. Measurement of vacua below 10^{-4} mm Hg. were shown to be of uncertain accuracy. (Author)

XDC-60-1-158 $1.60

General Electric Co., Cincinnati, Ohio.
AN ANALYTICAL STUDY OF A BALANCED REVERSE FOLDED FLOW, by J. F. Heyda. Preliminary rept. on Contract AT(11-1)-171. 15 Jan 60, 20p. 2 refs.

DC-59-6-31 $2.60

General Electric Co., Cincinnati, Ohio.
THE BENDING PROBLEM OF A SYMMETRICALLY LOADED CIRCULAR PLATE OF VARIABLE THICKNESS, by H. A. Eagle. Preliminary rept. on Contract AT(11-1)-171. 27 May 59, 26p. 16 refs.

DC-59-6-224 $2.60

General Electric Co., Cincinnati, Ohio.
PHOTOSTRESS TECHNIQUES, by W. Nickola. Preliminary rept. on Contract AT(11-1)-171. 19 June 59, 28p. 2 refs.

DC-59-12-117 $3.60

General Electric Co., Cincinnati, Ohio.
TORSION TEST OF BYPASS VALVE ROCKER ARM SHEAR SECTIONS, by Warren E. Greenwald. Preliminary rept. on Contract AT(11-1)-171. 10 Dec 59, 37p.

NASA N62-12547 $2.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
DETERMINATION OF PRESSURE VESSEL STRENGTHS AT -423°F AS INFLUENCED BY NOTCHES OF VARIOUS RADII, by Howard F. Calvert and Richard H. Kemp. 1962, 27p. 4 refs.

AD-277 029 repriced $2.50

Martin Marietta Corp., Baltimore, Md.
ELASTO-PLASTIC ANALYSIS OF STRUCTURES UNDER LOAD AND TWO-DIMENSIONAL TEMPERATURE DISTRIBUTIONS. VOLUME I. ANALYSIS DEVELOPMENT AND EXPERIMENTAL PROGRAM, by P. C. Huang and R. J. Edwards. Final rept. for 15 Dec 60-15 Nov 61, on Structural Design Criteria, Contract AF 33(616)7738. Apr 62, 119p. 6 refs. Rept no. RR-26-I; ASD-TR-61-667, Volume I.

DESCRIPTORS: *Thermal stresses, *Elasticity, *Plasticity, Strain gages, *Digital systems, Mathematical analysis, Aluminum alloys, Alloys, Experimental data.

This report describes investigations performed to determine experimentally the validity of the time-independent aspects of a time-dependent elasto-plastic stress and strain analysis method for structures exposed to complex load and two-dimensional elevated temperature environments. Experiments, consisting of tests of long flat plates subjected to uniaxial loads and temperatures which varied in two directions, are described. These were specifically designed to evaluate the accuracy of the analysis method. Magnitude and duration of the test variables

were such that the strains induced by loading were in the plastic range and appreciable thermal stress systems were introduced. Significant creep strains were eliminated by short-time continuous loading. Experimental strains were compared with analytical strains calculated for conditions identical with the tests. Within the range of test parameters selected, the degree of correlation achieved indicates verification of the time-independent portion of the analysis method. (Author)

AD-277 178 repriced $3.00

Martin Marietta Corp., Baltimore, Md.
ELASTO-PLASTIC ANALYSIS OF STRUCTURES UNDER LOAD AND TWO-DIMENSIONAL TEMPERATURE DISTRIBUTIONS. VOLUME II. SUMMARY OF TEST DATA, by P. C. Huang and R. J. Edwards. Final rept. 15 Dec 60-15 Nov 61, on Structural Design Criteria, Contract AF 33(616)7738. Apr 62, 170p. Rept. no. RR-26-II; ASD-TR-61-667, Volume II.

DESCRIPTORS: Structures, Load distribution, Stresses, *Thermal stresses, *Elasticity, *Plasticity, Temperature, Experimental data, Tables, Sheets, Aluminum alloys

This report describes investigations performed to determine experimentally the validity of the time-independent aspects of a time-dependent elasto-plastic stress and strain analysis method for structures exposed to complex load and two-dimensional elevated temperature environments. Experiments, consisting of tests of long flat plates subjected to uniaxial loads and temperatures which varied in two directions, are described. These were specifically designed to evaluate the accuracy of the analysis method. Magnitude and duration of the test variables were such that the strains induced by loading were in the plastic range and appreciable thermal stress systems were introduced. Significant creep strains were eliminated by short-time continuous loading. Experimental strains were compared with analytical strains calculated for conditions identical with the tests. Within the range of test parameters selected, the degree of correlation achieved indicates verification of the time-independent portion of the analysis method. (Author)

Aerodynamics and Pneumatics

NASA N62-12454 $7.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
HYPERSONIC AERODYNAMIC PROBLEMS OF THE FUTURE, by H. Julian Allen. 1962, 73p. 40 refs.

NASA N62-12538 $1.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
A WIND TUNNEL USING ARC-HEATED AIR FOR MACH NUMBERS FROM 10 TO 20, by Forrest E. Gowen and Vaughn D. Hopkins. 1962, 20p. 15 refs.

NASA N62-12910 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
LOW DENSITY SPHERE DRAG WITH EQUILIBRIUM AND NON-EQUILIBRIUM WALL TEMPERATURE, by H. Ashkenas. 1962, 17p. 4 refs.

NASA N62-12481 $2.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EXPERIMENTAL INVESTIGATION OF THE AIR-HELIUM SIMULATION PROBLEM ON VARIOUS GENERAL AND SPECIFIC CONFIGURATIONS AT HYPERSONIC SPEEDS, by Arthur Henderson, Jr. 1962, 24p. 14 refs.

NASA N62-13760 $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A WIND TUNNEL INVESTIGATION OF THE LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF TWO FULL-SCALE FUSELAGE MODELS WITH APPENDAGES, by Julian L. Jenkins, Jr., Matthew M. Winston, and George E. Sweet. July 62. 43p. 20 refs. Rept. NASA TN D-1364.

PB 160 688 $3.60

Polytechnic Inst. of Brooklyn, N. Y.
LAMINAR HEAT TRANSFER ON BLUNT-NOSED BODIES IN THREE-DIMENSIONAL HYPERSONIC FLOW, by Roberto Vaglio Laurin. Rept. on Aerodynamic Research, Contract AF 33(616)3265. May 58, 39p. 9 refs. WADD Technical note 58-147; AD-155 588.

DESCRIPTORS: *Blunt bodies, Bodies of revolution, *Heat transfer, *Hypersonic flow, Hypersonics, Laminar boundary layer, Boundary layer, Aerodynamics.

It is shown that in the presence of highly cooled surfaces and of moderate Mach numbers at the outer edge of the boundary layer, the crossflow in the boundary layer is negligible even for large transversal pressure gradients. From this consideration a rapid method for estimating the heat transfer over the nose portion of arbitrary three-dimensional blunt bodies in hypersonic flight is derived. The approximate results thus obtained compare very favorably with known exact solutions. The method in question reduces the boundary-layer problem to the determination of the inviscid streamline pattern on the surface of the body; a procedure for obtaining these streamlines from a pressure distribution measurement is outlined (Author)

PB 160 686 $4.60

Polytechnic Inst. of Brooklyn, N. Y.
SHROUD TESTS OF PRESSURE AND HEAT TRANSFER OVER SHORT AFTERBODIES WITH SEPARATE WAKES, by Martin H. Bloom and Adrian Pallone. Rept. on Aerodynamic Research, Contract AF 33(616)3265. June 58, 47p., WADC Technical note 58-185; AD-155 690.

DESCRIPTORS: *Wind tunnel models, *Aerodynamic heating, *Heat transfer, Pressure, Measurement, Wake, Reynolds number, Mach number, Wake.

Experimental measurements of pressures and heat transfer rates over three blunt afterbodies of small fineness-ratio are presented. The afterbodies are generally similar in shape but have different step-down heights from the forebody. Tests were made by means of a new shroud-technique over a range of Reynolds numbers closely corresponding to typical flight conditions at Mach numbers on the order of 20 considering models on the order of 5 feet in diameter at about 100,000 feet altitude. Stagnation temperatures on the order of 1300° R to 1600° R were employed. Surface temperatures varied between 560° R and 800° R. A comparison is made with values obtained from tests of Chapman at Mach numbers on the order 2 or 3. Qualitative and some quantitative agreement is noted. The results are presented and compared with each other in terms of non-dimensional variables based on flow conditions at the exit shoulder just prior to the afterbody.

NASA N62-13724- $1.10

William Marsh, Rice U., Houston, Tex.
RESEARCH ON IONIZATION PHENOMENA IN HYPERSONIC WIND TUNNELS, by Alan J. Chapman and Herbert K. Beckmann. Semiannual status rept. no. 5, 1 Apr-30 Sep 61, on NASA Grant NsG-3-59. 1 Oct 61. 4p. 1 ref.

Hydrodynamics, Hydraulics, and Hydrostatics

PB 181 351 $0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
DEVELOPMENT OF AN ALL-WEATHER HYDRAULIC BRAKE FLUID, by Charles B. Jordan. Interim rept. no. 1. 9 Feb 62, 9p. 5 refs. Rept. no. CCL #115.

DESCRIPTORS: *Hydraulic fluids, *Hydraulic brakes, Physical properties, Packaging, Storage

The object of this study was to develop an all-weather hydraulic brake fluid having the essential physical characteristics of both heavy duty and Arctic fluids. A second objective was to impart packaging and storage properties to the fluid. Brake fluids were formulated and compounded to meet these objectives. The most suitable fluids were subjected to tests outlined in Specifications VV-H-910a and MIL-H-13910, and in addition simulated vehicle and storage tests were started. The fluid outlined herein appears to meet the stated objectives with both natural and SBR synthetic rubber brake cups. Storage tests are still in progress and field tests have been started. (Author)

PB 181 352 $0.75

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
ENGINEERING STUDIES ON SOLUBILIZATION ADDITIVES FOR WATER IN MINERAL OIL, by Charles B. Jordan. 20 Apr 62, 21p. 2 refs. Rept. no. CCL #118.

DESCRIPTORS: *Hydraulic fluids, *Mineral oils, Water, Solubility, *Organic solvents, *Additives.

The object of this study was to find an additive capable of solubilizing small amounts of water in mineral oil throughout the temperature range of -65° F to + 400° F. Hydrophilic substances which were soluble in mineral oil were tried. When none proved satisfactory, hundreds of available organic chemicals containing different functional groups were tried, in the event that some of these materials would exhibit unpredicted favorable solubilization properties. The trend of solvency in relationship to carbon content within each individual homologous series was studied. Although there were instances where solubilization occurred, no single additive or mixture was found which would give the desired results over the specified temperature range. (Author)

PB 160 723 $6.60

Naval Ordnance Test Station [China Lake] Calif.
THEORY OF WATER ENTRY OF MISSILES WITH FLAT NOSES, by E. P. Cooper. 26 Apr 49, 64p. 12 refs. NAVORD rept. 1154; NOTS 208.

DESCRIPTORS: *Guided missiles, Air to underwater, *Water entry, Theory, Naval research, Underwater ordnance, Underwater projectiles, *Projectile caps, Projectile trajectories, Torpedoes, *Torpedo noses, Numerical analysis, Numerical methods and procedures.

A theory which describes the important phenomena involved in the kinematics of water entry of flat-nose projectiles is presented. The existence of a "similarity solution" simplifies the general problem and makes possible the formulation of a specific and feasible procedure for calculations. This procedure involves successive approximations; several criteria which may be used as a guide for choosing the optimum first approximation are discussed. (Author)

METALLURGY

ARF-2198-21 $1.10

Armour Research Foundation, Chicago, Ill.
IMPROVED ZIRCONIUM ALLOYS. Quarterly rept. 1 July-30 Sep 61, on Contract AT(11-1)-578. Oct 61, 6p. EURAEC-168.

ARF-2198-24 $1.60

Armour Research Foundation, Chicago, Ill.
IMPROVED ZIRCONIUM ALLOYS. Quarterly rept. 1 Oct 61-31 Dec 61, on Contract AT(11-1)-578. 12 Jan 62, 12p. 1 ref. EURAEC-262.

GA-563 $3.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
IRRADIATION EFFECTS ON THE SURFACE REACTIONS OF METALS, by M. Simnad, J. L. White and F. D. Carpenter. Summary rept. 15 Jan-1 Oct 58, on Contract AT(04-3)-179. 31 Oct 58, 34p.

DC-60-2-726 $1.60

General Electric Co., Cincinnati, Ohio.
304 BORIDED STAINLESS STEEL TENSILE DATA, by R. A. Winter. Preliminary rept. on Contract AT(11-1)-171. 3 Feb 60, 15p.

HW-67811* $1.60

Hanford Atomic Products Operation, Richland, Wash.
THE ROLE OF THE OXIDATION RATE ON THE HYDRIDING OF ZIRCALOY-2 BY GASEOUS HYDROGEN, by D. W. Shannon. Interim rept. no. 3, on Contract AT(45-1)-1350. 15 Dec 60, 17p. 3 refs.

NASA N62-13089 $3.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
A PRELIMINARY REPORT ON THE NASA SHEET ALLOY SCREENING PROGRAM FOR MACH 3 TRANSPORT SKINS, by G. B. Espey, R. T. Bubsey, and W. F. Brown, Jr. 1961. 39p. 9 refs.

TID-15414 $2.60

Los Alamos Scientific Lab., N. Mex.
EFFECTS OF ULTRASONIC ENERGY ON METALS AND ALLOYS. A BIBLIOGRAPHY, comp. by Lois Godfrey. Rept. on Contract W7405-eng-36. 18 Jan 57, 29p. 180 refs.

PB 160 735 $1.60

Martin [Marietta] Corp., Baltimore, Md.
AUTOCLAVE TESTING OF INCONEL, by J. W. McGrew. Rept. on Contract DA 44-009-eng-3581. Sep 59, 20p. 15 refs. Rept. no. MND-E-2154; AD-228 709.

DESCRIPTORS: *Alloys, Chromium alloys, Iron alloys, Nickel alloys, Stresses, *Corrosion, Heat exchangers.

Stressed and welded specimens of Inconel were exposed to five severe environmental conditions to test the stress corrosion resistance of the alloy. The experiments were conducted in autoclaves operating at 500° F and 680 psi for 500 hours. The environmental conditions included variations in concentrations of chloride, oxygen and a method of pH adjustment. The specimens were mounted so that one U-bend specimen was immersed in water and the other was exposed to the steam phase. A weld specimen was placed at the vapor liquid interface. A dull brown adherent coating was formed on all the samples but none of the samples cracked or pitted. The average penetration for all specimens was 0.35 mil/year and the highest penetration for a single specimen was 0.90 mil/year. These low corrosion rates, after due consideration of the environmental conditions, show that Inconel has a high corrosion resistance and might be successfully used in heat exchangers with very little secondary water treatment.

AD-276 057 repriced $1.00

Naval Ordnance Lab., White Oak, Md.
SPALL STUDIES IN COPPER, by R. A. Plauson, J. Grimsley, and A. D. Solem. 28 Dec 61, 38p. 11 refs. NOLTR 61-121.

DESCRIPTORS: *Spallation, *Copper, Stresses, Microstructure, Gases, Guns, Projectiles.

NMI-2105 $1.60

Nuclear Metals, Inc., Concord, Mass.
FUNDAMENTAL AND APPLIED RESEARCH AND DEVELOPMENT IN METALLURGY. Progress rept. for Mar 62, on Contract AT(30-1)-2784. 24 May 62, 19p. 10 refs.

NMI-2104 $3.60

Nuclear Metals, Inc., Concord, Mass.
FUNDAMENTAL AND APPLIED RESEARCH AND DEVELOPMENT IN METALLURGY. Progress rept. on Contract AT(30-1)-2784. 4 May 62, 35p. 9 refs.

TID-15370 $1.60

Purdue U. School of Metallurgical Engineering, Lafayette, Ind.
THE EFFECT OF OXYGEN PRESSURE ON THE OXIDATION OF CHROMIUM, by Richard E. Grace. Technical progress rept. 1 Mar 61-28 Feb 62, on Contract AT(11-1)-776. Apr 62, 13p. 6 refs.

Light Metals

NASA N62-12504 $2.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
INFLUENCE OF COLD ROLLING AND AGING ON THE SHARP NOTCH PROPERTIES OF β Ti SHEET, by A. J. Repko and W. F. Brown, Jr. 1962, 22p. 11 refs.

FXM-4986 $1.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
PHYSICAL AND THERMODYNAMIC PROPERTIES OF LITHIUM, by N. T. Crane. Rept. on Contract AT(11-1)-229. 19 Jan 61, 18p. 20 refs.

AD-277 210 repriced $2.00

Republic Aviation Corp., Farmingdale, N. Y.
A FEASIBILITY STUDY ON THE DEVELOPMENT OF A PRE-CRACK FATIGUE DAMAGE INDICATOR, by Jerome M. Kossar. Final rept. on Structural Design Criteria, Contract AF 33(616)7103. Apr 62, 72p. 9 refs. Rept. no. RAC 620; ASD-TR-61-719.

DESCRIPTORS: *Fatigue (Mechanics), *Structures, Wire, Bonding, Gages, Stresses, *Failure (Mechanics) *Aluminum alloys, Load distribution, Aluminum wire.

The feasibility of the development of a compact, remote indicating fatigue damage indicator is investigated. The investigation concerns several approaches to the prediction of fatigue failure primarily in 7075-T6 aluminum structure; however, some developed indicators may prove applicable to other structural materials. Test data are included for each of the techniques investigated. One of the gages developed in this program shows excellent promise of fulfilling the requirements of a fatigue damage indicator and is considered feasible for further development. (Author)

AD-277 228 repriced $1.25

Watertown Arsenal, Mass.
RECOMMENDED METHODS OF THE PANEL ON METHODS OF ANALYSIS. 8 June 62, 49p. 9 refs. Metallurgical Advisory Committee on Titanium Information Bull. no. T8, part 3.

DESCRIPTORS: *Metallurgy, Metallurgical analysis, *Titanium, *Titanium alloys, Niobium, Tantalum, Hydrogen, Oxygen, Determination, Ion exchange, Gravimetric analysis, Separation, Melting, Vacuum systems.
Contents:
Recommended Methods:
Columbium and Tantalum, Ion-Exchange, Gravimetric
Hydrogen, Hot Extraction
Oxygen, Inert-Gas Fusion
Oxygen (and Hydrogen), Vacuum Fusion, Platinum-Flux Technique

Structural Metallurgy and Corrosion

NASA N62-13813 $3.60

Aerojet-General Corp., Azusa, Calif.
MERCURY CORROSION LOOP TESTING PROGRAM. Quarterly rept., 1 Jan-31 Mar 62, on Contract NAS3-1925. 27 Apr 62. 35p. Rept. 0584-04-2.

HW-71958-RD $1.10

Hanford Atomic Products Operation, Richland, Wash.
THE RELATION OF FRACTION CORROSION PRODUCT HYDROGEN PICKUP TO LAYER STRUCTURE IN THE ZIRCONIUM OXIDE CORROSION PRODUCT, by R. L. Dillon, B. Griggs, and others. 6 Dec 61, 8p. 2 refs.

PB 160 692 $1.10

Southern Research Inst., Birmingham, Ala.
EVALUATION OF SOME DECONTAMINATION PROCEDURES, by Edward W. Lang. Rept. no. 13 (Final) 28 Feb 57-31 Mar 58, on Contract DA 18-064-404-cml-119. 9 May 58, 9p. Rept. no. 3597-740-XIII; AD-202 547.

DESCRIPTORS: *Biological warfare agents, *Bactericides, *Decontamination, *Formaldehyde, Methyl propionates, Acetones, Corrosion.

The corrosive action on various metals caused by β-propiolactone (I), in the forms of liquid, vapor, and aerosol fallout, was determined. The results indicated that solutions of I and typical solvents did not seriously attack most metals or alloys at 130°F or less. The corrosion by moist and anhydrous vapors of I on typical metals was slight at 70° and 130°F. The maximum corrosion rates were 0.005 and 0.007 in. penetration per year for mild steel and cast iron when exposed at 130°F to vapors above a 50% solution of I in H_2O. The corrosion rates were negligible when I was applied to the surfaces of metal specimens during a 30-day exposure period. Ethyleneimine vapor with no moisture present caused negligible corrosion of 10 metals and alloys after 28 days of exposure at 70°F. Nylon and polystyrene specimens were the only common plastics markedly affected after being wetted for 100 hr with simulated fallout of I at 100°F. No appreciable stabilizing effect on I was achieved by 80% and 20% additions each of dioxan and 4 chlorinated hydrocarbon solvents, after storage for 70 wk at 70°, 100°, and 130°F. Cotton clothing offered protection to exposure of the skin to I vapor. Patches of rubber, leather, and wool exposed to 1.5 mg/l of I caused slight to moderate erythema and slight vesiculation. Details concerning the storage stability of Detroform, evaluation of a Dyna-fog disseminator, and preparation of self-sterilizing floor waxes and plastic films are to be found in previous reports. (See also PB 138 234)

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

ANL-6517 $8.10

Argonne National Lab., Ill.
PHYSICS DIVISION. Summary rept. Feb-Mar 62, on Contract W-31-109-eng-38. 86p. 26 refs.

ARF 1164-24 $2.60

Armour Research Foundation, Chicago, Ill.
RESEARCH STUDY ON NEUTRON INTERACTIONS IN MATTER AS RELATED TO IMAGE FORMATION, by H. V. Watts. Rept. 1 Jan-31 Mar 62, on Contract AT(11-1)-578. 27 Apr 62, 22p.

WAPD-T-1236 $1.10

Bettis Atomic Power Lab., Pittsburgh, Pa.
A SIMPLE APPROXIMATE TEST FOR SPATIAL XENON STABILITY, by D. R. Harris and P. S. Lacy. Rept. on Contract AT(11-1)-GEN-14. Sep 60, 7p. 4 refs.

BNL-5728 $1.60

Brookhaven National Lab., Upton, N. Y.
APPLICATIONS OF RADIATION TO CHEMICAL PROCESSES, by B. Manowitz. Oct 61, 15p. 4 refs.

XDCL-59-2-7 $2.60

General Electric Co., Cincinnati, Ohio.
THE CALCULATION OF NEUTRON SPECTRA, by J. W. Haffner. Preliminary rept. on Contract AT(11-1)-171. 9 Jan 59, 21p.

DC-60-7-9 $7.60

General Electric Co., Cincinnati, Ohio.
PROGRAMS 20-2, -3, -4, AND -5 AUXILIARY PROGRAMS TO SHIELD COMPUTER PROGRAM 18-0, by J. E. MacDonald, J. P. Yalch, and L. Almeleh. Rept. on Contract AT(11-1)-171. 30 June 60, 76p.

HW-SA-2530 $1.10

Hanford Atomic Products Operation, Richland, Wash.
THE ANALYSIS OF URANIUM AND THE TRANSURANIUM ELEMENTS BY X-RAY FLUORESCENCE SPECTROMETRY, by R. J. Kofoed. Rept. on Contract AT(45-1)-1350. 2 Apr 62, 9p. 5 refs.

HW-62689 $1.60

Hanford Atomic Products Operation, Richland, Wash.
CONTINUOUS ION EXCHANGE DEVELOPMENT. A QUALITATIVE REVIEW, by G. A. Nicholson. Rept. on Contract AT(45-1)-1350. 10 Nov 59, 11p. 4 refs.

HW-73135 $1.10

Hanford Atomic Products Operation, Richland, Wash.
PEROXYACETATE SEPARATION OF CERIUM (IV) FROM TRIVALENT RARE EARTHS IN PUREX PROCESS SOLUTIONS, by L. F. Lust and H. H. Van Tuyl. Rept. on Contract AT(45-1)-1350. 26 Mar 62, 10p. 4 refs.

NASA N62-13904 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
FLUORINE-FLUORINE NUCLEAR SPIN-SPIN DECOUPLING, by Daniel D. Elleman and Stanley L. Manatt. Rept. on NASA Contract NAS7-100. Apr 62. Rept. JPL TR-32-262.

Reprint from Journal of Chemical Physics 36:1945-1946, 1 Apr 62.

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Johns Hopkins U., Baltimore, Md.
STUDIES IN NUCLEAR CHEMISTRY. Progress rept. on Contract AT(30-1)-1396. Feb 62, 5p.

TID-14812 $16.00

Kansas State U., Manhattan.
LOW ENERGY INVESTIGATIONS OF RADIATION CHEMISTRY, by Robert W. Kiser. Technical progress rept. on Contract AT(11-1)-751. 22 Jan 62, 246p. 11 refs.

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Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
PROGRESS REPORT, 1 May 61-1 May 62, on Contract AT(30-1)-905. 5 Apr 62, 163p. 5 refs.

NYO-2668 $12.00

Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
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NYO-10023 $1.60

Little, Arthur D., Inc., Cambridge, Mass.
THE EFFECT OF ELECTROPHILIC ADDITIVES ON THE RADIOLYTIC PRODUCTS OF ORGANIC CHAIN REACTIONS. Quarterly rept. Feb-Apr 62, on Contract AT(30-1)-2904. 15 June 62, 12p.

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Los Alamos Scientific Lab., N. Mex.
ANALYTICAL METHODS FOR RADIOSTRONTIUM ESPECIALLY APPLICABLE TO ANALYSIS OF ORGANIC MATERIALS, 1950-1955, A BIBLIOGRAPHY, comp. by Gretchen R. Riese. Rept. on Contract W7405-eng-36. 21 Jan 57, 16p. 60 refs.

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NEUTRON CROSS SECTION AND SPECTRA STUDIES, by P. F. Zweifel. Technical progress rept. on Contract AT(11-1)-917. Mar 62, 20p. 10 refs. ORA-03712-2-P.

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Minnesota U., Minneapolis.
THE CONTRIBUTION OF ELECTRONICALLY EXCITED STATES TO THE RADIATION CHEMISTRY OF ORGANIC LIQUIDS. Technical progress rept. on Contract AT(11-1)-913. Mar 62, 24p. 17 refs.

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ORNL-TM-246 $1.10

Oak Ridge National Lab., Tenn.
EUROCHEMIC ASSISTANCE PROGRAM, by R. J. Sloat and E. M. Shank. Progress rept. July 61-June 62. 2 July 62, 8p.

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Oak Ridge National Lab., Tenn.
OGRE-P1, A MONTE CARLO PROGRAM FOR COMPUTING GAMMA-RAY TRANSMISSION THROUGH LAMINATED SLABS, by D. K. Trubey, S. K. Penny, and M. B. Emmett. 23 May 62, 5p. 3 refs.

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MSA CALLERY CHEMICAL COMPANY MASS TRANSFER PROGRAM SUMMARY. Declassified 14 Apr 60, 49p.

RAI-201 $2.60

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THE DEVELOPMENT OF LARGE FISSION PRODUCT BETA SOURCES, by Jacques J. Weinstock, Ella Y. Mirocznik and P. Murali Krishna. Quarterly rept., 1 Jan-31 Mar 62, on Contract AT(30-1)-2186. 23 May 62, 25p. 5 refs.

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RRL-79 (Q-19) $2.60

Radiation Research Labs., Mellon Inst., Pittsburgh, Pa.
QUARTERLY REPORT, 1 Jan-31 Mar 62, on Contract AT(30-1)-2310. 12 Apr 62, 20p.

Y-1142 $4.60

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THE APPLICATION OF SIMULTANEOUS COLLECTION AND AUTOMATIC COMPUTATION IN THE MASS SPECTROMETRIC ANALYSIS OF LITHIUM, by Hugh O. Finley, Julian F. Been, and others. 15 Oct 56, declassified. 34p. 4 refs. M-3679.

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A MONTE CARLO CALCULATION OF AIR SCATTERED NEUTRONS, by J. E. MacDonald, N. R. Baumgardt, and A. Trampus. Preliminary rept. on Contract AT(11-1)-171. 26 July 60, 51p. 5 refs.

NASA N62-13754 $1.00

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SOLAR PROTONS, by Keith W. Ogilvie. July 62, 38p. 30 refs. Rept. NASA TN D-1139.

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SCATTERING OF GAMMA RAYS AND X-RAYS AND HIGH ENERGY ELECTRONS IN MATTER. A BIBLIOGRAPHY, comp. by Gretchen R. Riese. Rept. on Contract W7405-eng-36. 11 Sep 57, 38p. 110 refs.

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Λ^0 MAGNETIC MOMENT IN THE GOLDHABER MODEL, by L. Landovitz and L. Marshall. Rept. on Contract AT(30-1)-2625. 7p. 3 refs. Prepared in cooperation with Yeshiva U., New York, N. Y. and The National Science Foundation, Washington, D. C.

Instruments and Installations

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Diamond Ordnance Fuze Labs., Washington, D. C.
EXTENDED APPLICATION OF A COBALT CLASS DOSIMETER, by Wm. T. K. Johnson. 5 June 62, 17p. 12 refs. Technical rept. TR-1050.

DESCRIPTORS: *Cobalt, Glass, *Dosimeters, Gamma rays, Thermal neutrons, Measurement, Fast neutrons, Neutrons, Radiation instruments, Calibration

Cobalt glass dosimeters, normally used to measure gamma ray and electron fields, have been used to measure gamma ray and coexistent thermal neutron fields in the presence of a fast neutron field. The dosimeter is darkened in proportion to the energy deposited and this darkening is calibrated in known gamma ray and thermal neutron fields. A three-glass sandwich was used to distinguish the effects of gamma rays and thermal neutrons. The sensitivity of the

glass to various energy gamma and x-rays is presented. A simple spectrophotometer is used to measure the transmission of light through the glass dosimeter. (Author)

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DETECTION LEVEL OF THE FILM BADGE SYSTEM, by R. H. Wilson. 28 Nov 60, 5p..

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A HIGH INTENSITY NANOSECOND PULSED VAN DE GRAAFF ACCELERATOR, by Leon E. Beghian and Matti K. Salomaa. Rept. on Contract AT(30-1)-2098. 21 May 62, 34p. 11 refs.

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A CONSTRUCTION FOR THE INVESTIGATION OF COLLIMATOR PERFORMANCE, by J. M. Carpenter. Rept. on Contract AT(11-1)-917. [1962] 18p.

DP-523 $1.60

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NEUTRON SPARK COUNTER, by F. P. Caiati. Rept. on Contract AT(07-2)-1. Oct 60, declassified 11 Apr 62. 11p. 7 refs.

TID-15350 $6.60

Stanford Linear Accelerator Center, Stanford U., Calif.
TWO-MILE ACCELERATOR PROJECT. Status rept. 1 Oct-31 Dec 61, on Contract AT(04-3)-363. Jan 62, 65p. 15 refs. M-294.

Nuclear Engineering and Power

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ARMY PWR SUPPORT AND DEVELOPMENT PROGRAM. Six Months summary rept. 1 Oct 61-31 Mar 62, on Contract AT(30-1)-2639. 25 May 62, 184p. 32 refs.

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Alco Products, Inc., Schenectady, N. Y.
HAZARDS REPORT FOR PM-2A CORE II, by J. R. Coombe and L. D. Stephenson. Rept. on Contract AT(30-1)-2639. 21 June 62, 21p.

APAE-96 $14.50

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PHYSICS MEASUREMENTS ON SM-1 CORE I, by S. H. Weiss. Summary rept. on Contract AT(30-1)-2639. 6 Feb 62, 218p. 28 refs.

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SM-1 CORE III WITH TYPE 3 ELEMENTS, by J. N. Inglima, R. H. Beam, and others. Preliminary technical rept. on Contract AT(30-1)-2639. 30 Mar 62, 52p. 26 refs.

APAE-92 $19.75

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Alco Products, Inc., Schenectady, N. Y.
STRESS ANALYSIS OF THE PM-2A REACTOR VESSEL, by B. J. Rowekamp, D. W. McLaughlin and others. Rept. on Contract AT(30-1)-2639. 14 May 62, 125p. 7 refs.

ACNP-62005 $8.60

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PATHFINDER ATOMIC POWER PLANT. Technical progress rept. Oct-Dec 61, on Contract AT(11-1)-589. 20 Apr 62, 97p. 7 refs.

BAW-1199 $2.60

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REACTIVITY MEASUREMENTS ON UNPERTURBED, SLIGHTLY ENRICHED URANIUM DIOXIDE LATTICES, by Arland L. MacKinney and Russell M. Ball. June 60, 21p.

PB 160 757 $2.60

Battelle Memorial Inst. [Columbus, Ohio].
SURVEY OF NONMETALLIC LIQUID COOLANTS FOR NUCLEAR-POWER PILES, by H. L. Shaw and F. W. Boulger. Rept. 11 Nov 49-5 May 50. 26 May 50, declassified 11 June 61. 29p. 39 refs. Rept. no. NEPA-1476.

DESCRIPTORS: *Reactor coolants, Coolants, Liquids, Materials, Thermal conductivity, Heat tolerance.

Approximately 190 materials appeared to have melting and boiling temperatures in the range suitable to warrant their consideration as liquid coolants for nuclear-power piles. A paucity of thermal-conductivity and heat-capacity data prevented further estimates of suitability of all but nine of these materials. Of these nine nonmetallics, only sodium hydroxide appeared to offer possibilities when considered according to the NEPA formula. Experimental determinations of viscosities and thermal properties are desirable on some of the materials. (Author)

WAPD-PWR-TE-70 $1.60

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DL-S-185 (T-641105), FAILED ELEMENT DETECTION AND LOCATION SYSTEM (OPERATIONAL) TEST, by P. W. Frank. Rept. on Contract AT(11-1)-GEN-14. Apr 62, 11p. 4 refs.

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REACTOR COOLANT RADIONUCLIDE BASE LEVELS PWR CORE I, SEED 2, by W. Lechnick. Rept. on Contract AT(11-1)-GEN-14. Feb 62, 6p. DLCS 3540101.

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Duquesne Light Co., Shippingport, Pa.
MONTHLY OPERATING REPORT, MARCH 1962. Rept. on Contract AT(11-1)-292. 26 Apr 62, 55p.

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XDCL-59-2-722 $1.10

General Electric Co., Idaho Falls.
TEST PROGRAM FOR P-102 ION CHAMBER CALIBRATION AND ENDURANCE TEST, by T. Brekken. Preliminary rept. on Contract AT(11-1)-171. 20 Feb 59, 8p.

DC-59-7-2 $4.60

General Electric Co., Schenectady, N. Y.
REACTOR CONTROL COMPONENTS STUDY. PART II: A PULSE RELAXATION AMPLIFIER CIRCUIT ANALYSIS, by D. L. Watrous. Preliminary rept. on Contract AT(11-1)-171. 27 Jan 59, 41p.

HW-SA-2531 $6.60

Hanford Atomic Products Operation, Richland, Wash.
AN ANALYSIS OF A CYLINDRICAL GRAPHITE TUBE SUBJECTED TO DIAMETRAL COMPRESSION LOADING, by Francis John Kempf. Master's thesis. 11 Apr 62, 67p. 15 refs.

HW-58068 $1.10

Hanford Atomic Products Operation, Richland, Wash.
APPLICATION OF PYROCHEMICAL PROCESSING DEVELOPMENTS TO THE URANIUM-233 ALUMINUM FUEL ELEMENT PROGRAM, by W. L. Lyon, R. H. Moore, and E. E. Voiland. Rept. on Contract AT(45-1)-1350. 29 Sep 58, 10p. 5 refs.

HW-70643 $2.60

Hanford Atomic Products Operation, Richland, Wash.
DESCRIBING FUEL ELEMENT DISTORTION USING ORTHOGONAL POLYNOMIALS, by J. L. Jaech. Rept. on Contract AT(45-1)-1350. 4 Aug 61, 21p.

HW-70400 $1.60

Hanford Atomic Products Operation, Richland, Wash.
DISCUSSION OF RUPTURE MODEL WITH EMPHASIS ON EVALUATION OF EXPOSURE EFFECT, by J. L. Jaech. Rept. on Contract AT(45-1)-1350. 17 July 61, 10p. 2 refs.

HW-71649 $2.60

Hanford Atomic Products Operation, Richland, Wash.
FRENCH AND BRITISH METHODS IN REACTOR THEORY, by J. R. Triplett. Rept. on Contract AT(45-1)-1350. 9 Nov 61, 24p. 8 refs.

HW-73072 $5.60

Hanford Atomic Products Operation, Richland, Wash.
IRRADIATION ALTERATION OF URANIUM DIOXIDE, by W. E. Roake. Rept. on Contract AT(45-1)-1350. Mar 62, 53p. 18 refs.

HW-70919 $2.60

Hanford Atomic Products Operation, Richland, Wash.
A NONDESTRUCTIVE TEST FOR DETERMINING GRAIN SIZE AND UNIFORMITY IN MASSIVE URANIUM FUEL CORES, by G. L. Waldkoetter. 1 Sep 61, 24p.

HW-69300(Rev.) $1.60

Hanford Atomic Products Operation, Richland, Wash.
A SEMI EMPIRICAL METHOD OF ESTIMATING MATERIAL BUCKLINGS FOR SLIGHTLY ENRICHED URANIUM TUBES IN LIGHT WATER, by C. L. Brown. Rept. on Contract AT(45-1)-1350. 5 Mar 62, 18p. 11 refs.

NYO-9790 $15.50

Laboratories for Research and Development, Franklin Inst., Philadelphia.
SURVEY OF COMPONENT REQUIREMENTS AND AVAILABILITY FOR GAS-COOLED NUCLEAR REACTOR POWER PLANTS. CIRCULATORS, by G. Novickis. Interim rept. on Contract AT(30-1)-2512. Aug 61, 221p. 71 refs. I-A2392-5.

NASA N62-12964 $6.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
METHODS OF TESTING THE NASA PLUM BROOK REACTOR FOR ITS HYDRAULIC CHARACTERISTICS, by Joseph M. Savino and C. D. Lanzo. 1962, 67p. 1 ref.

MND-C-2208 $10.50

Martin [Marietta Corp.] Baltimore, Md.
ANPP CODE DEVELOPMENT PROGRAM PRESSURIZED WATER TASK. Progress rept. no. 9 on Contract AT(30-1)-2431. Feb 62, 142p. 37 refs.

MND-C-2500-2 $14.00

Martin [Marietta Corp.] Baltimore, Md.
APWRC-CELCOR, A FORTRAN-II PROGRAM FOR MULTIPLE LETHARGY LEVEL Pl OR DSN CELL CORRECTIONS IN CYLINDRICAL, SPHERICAL AND ONE- OR TWO-DIMENSIONAL SLAB GEOMETRY, by G. A. Cannon and T. M. Olsen. Rept. on Contract AT(30-1)-2431. Mar 62, 219p. 17 refs.

MND-C-2500-5 $3.60

Martin [Marietta Corp.] Baltimore, Md.
APWRC-GAMICO, A MODIFICATION OF GAM-I FOR APPLICATION TO THE ARMY PRESSURIZED WATER REACTOR CODE, by G. A. Cannon, R. S. Hubner, and T. M. Olsen. Rept. on Contract AT(30-1)-2431. June 62, 36p. 5 refs.

MND-C-2500-4 $6.60

Martin [Marietta Corp.] Baltimore, Md.
APWRC-SYBURN, A FORTRAN-II PROGRAM FOR SYNTHESIZED TWO-DIMENSIONAL Pl OR DSN BURNUP CALCULATIONS, by E. A. Colbeth and T. M. Olsen. Rept. on Contract AT(30-1)-2431. June 62, 64p. 7 refs.

PB 160 736 $4.60

Martin [Marietta] Corp., Baltimore, Md.
TRANSIENT NONCONDUCTIVE HEAT TRANSFER AND STEAM FORMATION, by R. Magladry. Rept. on Contract DA 44-009-eng-3633. Oct 59, 44p. 5 refs. Rept. no. MND-E-2155; AD-230 390.

DESCRIPTORS: *Heat transfer, *Power reactors, Nuclear power plants, Analysis, Spert.

An analysis is given of the development, by macroscopic temperature and pressure measurement, of the rates of nonconductive heat transfer and steam formation associated with transient local boiling in a pool reactor. The results of the measurements are intended to provide conservative bases for operation or design limitations on the transient behavior of a reactor having pumped flow. They also complement the ANPP Martin programs being conducted on nucleate boiling and criticality for advanced pressurized water reactor cores. (Author)

IDO-11102 $2.60

Massachusetts Inst. of Tech., Cambridge.
IRRADIATION LOOP STUDIES OF ORGANIC REACTOR COOLANTS, by E. A. Mason and W. N. Bley. Quarterly rept. 1 July-30 Sep 61, on Contract AT(10-1)-1067. 1 Jan 62, 32p. 9 refs. MITNE-9.

NYO-9660 $12.50

Massachusetts Inst. of Tech., Cambridge.
MEASUREMENTS OF THE MATERIAL BUCKLINGS OF LATTICES OF NATURAL URANIUM RODS IN D_2O, by P. F. Palmedo, I. Kaplan, and T. J. Thompson Rept. on Contract AT(30-1)-2344. 20 Jan 62, 179p. 90 refs. MITNE-13.

NYO-9661 $13.00

Massachusetts Inst. of Tech., Cambridge.
A STUDY OF THE FAST FISSION EFFECTS IN LATTICES OF URANIUM RODS IN HEAVY WATER, by J. R. Wolberg, T. J. Thompson, and I. Kaplan. Rept. on Contract AT(30-1)-2344. 21 Feb 62, 183p. 73 refs. MITNE-15.

PB 160 755 $2.60

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
CRITICAL MASS IN OPERABLE, AIR-COOLED BERYLLIUM CARBIDE MODERATE REACTORS, by T. R. Mitchell. 10 Jan 50, declassified 16 Aug 61, 25p. 6 refs. NEPA no. 1263-EAR-R15.

DESCRIPTORS: Air cooled, *Beryllium carbide-modulated reactors, Critical assemblies, Operation, Reactor moderators, Fission product poisoning, Reactor reflector materials, Uranium

This report presents the criticality requirements of nuclear reactors at operating conditions; i.e., the effects of high temperature, coolant, coating and fission product poisons were incorporated in the calculations for the determination of critical reactor sizes and uranium requirements after 100 hours of continuous operation at 600,000 kw.

PB 160 754 $4.60

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
CRITICAL REACTOR REQUIREMENTS FOR URANIUM CARBIDE-BERYLLIUM CARBIDE-GRAPHITE SYSTEMS, by T. R. Mitchell. 15 Mar 49, declassified 16 Aug 61. 45p. 9 refs. NEPA no. 950-EAR-R7.

DESCRIPTORS: *Critical assemblies, *Beryllium carbide-moderated reactors, *Graphite moderated reactors, *Uranium, Reactor fuels, Neutron flux density, Reflectors, Thickness, Reactor reactivity

This report presents the criticality requirements of nuclear reactors having the following properties: Moderator and reflector material, $Be_2C+1/3$ C; Fissionable material, $U^{235}C_2$; Distribution of uranium in core, uniform; Distribution of voids (cooling channels) uniform; Shape, square cylinder; Temperature, 70°F; Diluents (coatings, coolant, etc.), neglected; Operating effects (poisoning, depletion, high temperature, etc) neglected.

PB 160 752 $3.60

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
CRITICAL REACTOR SIZES AND WEIGHTS FOR URANIUM CARBIDE-GRAPHITE SYSTEMS, by A. O. Moonetham. 15 June 48, declassified 11 Aug 61. 31p. 3 refs. Rept. no. NEPA 592-EAR-R3.

DESCRIPTORS: *Critical assemblies, *Graphite-moderated reactors, *Uranium compounds, *Carbides, Reactor fuels, Reactor theory, Reactor cores.

This report deals with criticality requirements for cylindrical, air-cooled, room temperature, homogeneous uranium carbide-graphite reactors utilizing completely enriched uranium and having graphite reflectors. Results are presented in the form of graphs relating uranium weight, total reactor weight, reactor size, core composition, reflector thickness, and free flow ratio. The data are intended only for assisting in the selection of design points from a wide range of variables, and are not considered adequate for prediction of critical masses in actual critical assemblies The theoretical considerations behind these calculated results are based on diffusion theory but are not included at this time. Some neutron flux spatial distributions are given. Also included are neutron flux energy distributions, fissioning energy distributions, and mean times between fissions for several reactors without reflectors. (Author)

PB 160 753 $1.60

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
THE HEAT CAPACITY OF BERYLLIUM CARBIDE POWDER IN STAINLESS STEEL CAPSULES AS A FUNCTION OF TEMPERATURE (400° - 1800°F) by Helen Powers, Theodore Kostigen, and J. B. Trice. Rept. on Method of NC-Ph-80720. 20 Apr 49, declassified 16 Aug 61. 17p. NEPA 932-SCR-32.

DESCRIPTORS: *Reactor moderators, Materials, *Beryllium compounds, *Carbides, Powders, Heat tolerance, Stainless steel, Test equipment, Temperature.

The mean heat capacity of a sample of powdered beryllium carbide, a possible moderator material for a nuclear reactor, was determined as a function of temperature. A thin walled stainless steel capsule containing the material was heated in an electric furnace and dropped into a water calorimeter. The following linear equation for mean heat capacity over the temperature range 50°C - T°C as a function of temperature, T, was derived from the data by the method of least squares:
$C_p = 0.299 + 2.16 \times 10^{-4}\ T\ ^{\circ}C + 0.005$ cal $gm^{-1}(^{\circ}C)^{-1}$.
The numerical value of C_p expressed by this equation is also equal to the mean heat capacity in BTU $lb^{-1}(^{\circ}F)^{-1}$. (Author)

PB 160 750 $1.60

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
PRELIMINARY INVESTIGATION OF METALLIC ELEMENTS IN MOLTEN LITHIUM, by D. S. Jesseman, G. D. Roben and others. 8 June 50, declassified 18 July 61. 14p. NEPA-1465.

DESCRIPTORS: *Liquid metals, *Lithium, *Metals, Solubility, Temperature, *Containment, Tests.

The solubilities of beryllium, chromium, columbium, iron, molybdenum, nickel, silicon, tantalum, titanium, tungsten, vanadium, and zirconium, in molten lithium have been investigated. Most of the data covered the temperature range between 482 and 1010°C (900 - 1850°F) for periods of 4, 24, and 100 hours. Nickel, silicon, and tungsten underwent complete degradation; beryllium, tantalum, and titanium were markedly soluble at 1010°C (1850°F); chromium, columbium, and zirconium showed a moderate increase in solubility with temperature; iron and vanadium showed negative solubility coefficients; molybdenum was only slightly soluble at 1010°C (1850°F). (Author)

PB 160 756 $1.60

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
PROGRESS IN THE DEVELOPMENT OF CERAMIC GLAZE COATINGS FOR BERYLLIUM CARBIDE UNDERBODIES, by Murray A. Schwartz and W. J. O'Leary. 15 Apr 50, declassified 6 Nov 61. 15p. Rept. no. NEPA 1425-EMR-71.

DESCRIPTORS: *Beryllium compounds, *Carbides, *Reactor fuels, *Fuel rods, *Ceramic coatings, Coatings, Refractory coatings.

This paper concerns the experimental progress made in the development of refractory coating techniques. A number of beryllium carbide-rich reactor fuel element shapes were coated with refractory aluminosilicate glass. The coating specimens satisfactorily passed preliminary screening tests in which they were held at 2500°F (1375°C), in air, for 500 hours.

PB 160 751 $8.10

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
STUDY OF GENERALIZED DILUENTS IN REACTORS OF FIXED GEOMETRY, by W. H. Long. 20 Oct 50, declassified 11 June 61. 86p. 14 refs. NEPA no. 1590.

DESCRIPTORS: Reactor theory, *Reactor moderators, *Fission product activity, *Reactor reactivity, Critical assemblies, Reactor coolants, Reactor cores, Neutron flux density, Absorption

Calculated critical masses as a function of diluent cross sections varying as $1/v$ or $1/v^2/5$ are presented graphically for reactors of a fixed size (2.5' core diameter) which is close to the current design point of NEPA reactors. Four moderators, beryllium metal, beryllium oxide, and beryllium carbide with 10% and 30% added graphite (by weight), are studied and compared. Critical masses for reactors composed of one of the four moderators, #310 stainless steel or molybdenum with either sodium or lithium 7 (99.93% pure) as a coolant are also considered. Various other effects such as production spectra, variation of critical mass with core diameter and reflector savings, variation of median energy for fission with diluent absorption are included as illustrative materials. An exposition of methods and assumptions is given with references to sources. (Author)

NUMEC-P-100 $6.60

Nuclear Materials and Equipment Corp., Apollo, Pa.
DEVELOPMENT OF PLUTONIUM-BEARING FUEL MATERIALS. Progress rept. 1 Jan-31 Mar 62, on Contract AT(30-1)-2389. 69p. 36 refs.

NMI-7248 $2.60

Nuclear Metals, Inc., Concord, Mass.
POWER REACTOR PROGRAM, by S. Isserow, R. W. Anderson and others. Progress rept. 1 Feb-28 Feb 62. 10 May 62, 29p.

ORNL-TM-220 $1.60

Oak Ridge National Lab., Tenn.
COATING OF UO_2 PARTICLES WITH BeO BY SOLUTION METHODS, by W. J. McDowell. 9 May 62, 14p. 3 refs.

ORNL-TM-203(Addendum) $1.10

Oak Ridge National Lab., Tenn.
MURGATROYD: AN IBM 7090 PROGRAM FOR THE ANALYSIS OF THE KINETICS OF THE MSRE, by C. W. Nestor, Jr. 25 May 62, 3p.

ORNL-TM-251 $6.60

Oak Ridge National Lab., Tenn.
SAFETY CALCULATIONS FOR MSRE, by P. N. Haubenreich and J. R. Engel. 15 May 62, 69p. 3 refs.

PRDC-TR-55 $2.60

Power Reactor Development Co., Detroit, Mich.
MONTHLY TECHNICAL REPORT. Rept. for Jan 62, on Contract AT(11-1)-476. May 62, 22p.

FXM-428 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
FIREBALL HYDRODYNAMICS, by T. Tucker. 27 May 53, declassified 9 May 61, 4p.

FXM-1447 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
RELATIONSHIP OF REFLECTOR THICKNESSES LESS THAN 30 CENTIMETERS TO CRITICAL MASS FOR THE 300 MEGAWATT P&WA FIREBALL REACTOR, by W. J. Offutt. 1 Dec 55, declassified 9 May 61, 3p.

FXM-1484 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
SAMARIUM POISONINC IN THE FIREBALL, by Burton W. Bellow. 29 Dec 55, declassified 9 May 61, 5p.

TIM-80 $2.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
COOLING OF LEAD SHIELDS, by L. E. Anderson. Rept. on Contract AT(11-1)-229. 19 Nov 54, declassified 9 May 61.

TIM-669 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
INVESTIGATION OF VIBRATION TRANSDUCERS FOR REACTOR USAGE, by S. Fanciullo. 3 May 61, 5p. 2 refs.

PB 160 713 $10.10

Stanford Research Inst., Menlo Park, Calif.
THEORETICAL STUDY OF GROUND MOTION INDUCED IN NONHOMOGENEOUS MEDIA BY NUCLEAR EXPLOSIONS. VOLUME I: STRESS AND DISPLACEMENT FIELDS PRODUCED BY AN EXPLOSION ABOVE A NONHOMOGENEOUS ELASTIC MEDIUM. PART 1. ILLUSTRATIVE EXAMPLES AND CODING. PART 2. THEORETICAL DEVELOPMENT OF COMPUTATION PROGRAM, by C. M. Ablow, R. Alverson and others. Final rept. on Contract AF 29(601)1948. 31 Dec 60, 133p. 3 refs. SRI Proj. SU-2893; AFSWC-TR-61-6, Vol. I.

DESCRIPTORS: *Nuclear explosions, Explosions, Detonation, Earth, Motion, Theory, Compression shock, Wave transmission, Stresses, Shear stresses, Elasticity, Air blast, Soils, Numerical analysis, Programming, Coding, Equations of motion.
In Part 1, a numerical example is set up to provide a test of the method developed in Part 2 for the solution of the stresses and displacements in an elastic half space caused by an axially symmetric airblast loading. The compressional and shear wave velocities, relative to the speed of sound in air, are taken as 1 z and 0.6, respectively, where z is the dimensionless depth. Results are shown for an arbitrary surface loading which has the general but not specific characteristics of the airblast from a nuclear surface burst. A complete description of coding procedures and the Balgol code are given in the appendix. In Part 2, a finite-difference numerical method of determining motions and stresses in an elastic nonhomogeneous half space due to a time dependent, axially symmetric surface loading is presented for cases in which compressional wave velocity varies linearly with depth, while the shear wave velocity is constant. The method may also be applied to layered media where the elastic parameters are constant in each layer but differ from layer to layer. The usual smearing of the compressional and distortional wave fronts in such methods is avoided by introducing a coordinate system following the front. (Author)

NDA-2134-3 $9.10

[United Nuclear Corp.] White Plains, N. Y.
A FEASIBILITY STUDY OF FAST U^{233}-Th BREEDER REACTORS. Rept. on Contract AT(30-1)-2303(VIII). 10 Oct 60, 100p. 44 refs.

NDA-14-155 $1.60

[United Nuclear Corp.] White Plains, N. Y.
NEUTRON PENETRATION THROUGH THE SIDE SHIELD OF THE APDA REACTOR, by Phillip S. Mittelman. 20 Dec 56, 17p. 8 refs.

UNC-5007 $10.10

United Nuclear Corp., White Plains, N. Y.
SIMPLIFIED METHODS OF PREDICTING TEMPERATURE TRANSIENTS IN A FAST REACTOR POWER EXCURSION, by Arthur J. Goldman. Rept. on Contract AT(30-1)-2832. 15 Apr 62, 128p. 8 refs.

WCAP-4121 $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
CVTR PROJECT CAROLINAS VIRGINIA NUCLEAR POWER ASSOCIATES, INC. Monthly progress rept. on Contract AT(30-1)-2289. Jan 62, 16p.

WCAP-4122 $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
CVTR PROJECT CAROLINAS VIRGINIA NUCLEAR POWER ASSOCIATES, INC. Monthly progress rept. Feb 62. on Contract AT(30-1)-2289. [1962] 18p.

WCAP-4123 $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
CVTR PROJECT CAROLINAS VIRGINIA NUCLEAR POWER ASSOCIATES, INC. Monthly progress rept. Mar 62, on Contract AT(30-1)-2289. [1962] 15p.

WCAP-4124 $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
CVTR PROJECT CAROLINAS VIRGINIA NUCLEAR POWER ASSOCIATES, INC. Monthly progress rept. on Contract AT(30-1)-2289. Apr 62, 18p.

CVNA-114 $12.50

Westinghouse Electric Corp., Pittsburgh, Pa.
REACTIVITY COEFFICIENTS AND NEUTRON SPECTRA IN A CLUSTERED, SLIGHTLY ENRICHED UO_2 D_2O TWO REGION LATTICE, by J. Jedruch and G. N. Hamilton. Mar 62, 175p.

CVNA-95 $13.00

Westinghouse Electric Corp., Pittsburgh, Pa.
THE THERMAL AND HYDRAULIC DESIGN OF THE CVTR PRESSURE TUBE, by R. O. Sandberg, L. E. Efferding, and A. A. Bishop. June 62, 185p. 28 refs.

Nuclear Reactions

TID-14157 $4.60

Bartol Research Foundation, Swarthmore, Pa.
STUDIES RELATING TO SCATTERING OF NEUTRONS AND ALLIED PHENOMENA, by D. M. Van Patter. Annual progress rept. for 1961, on Contract AT(30-1)-1679. 40p. 12 refs.

DC-60-12-98 $1.60

General Electric Co., Cincinnati, Ohio.
BERYLLIUM NEUTRON CROSS SECTIONS, by T. J. Kostigen. Preliminary rept. on Contract AT(11-1)-171. 19 Dec 60, 21p.

XDC-60-8-81 $2.60

General Electric Co., Cincinnati, Ohio.
PHOTON-PRODUCING AND NEUTRON ACTIVATION CROSS SECTIONS, by T. D. Roberts. Rept. on Contract AT(11-1)-171. 30 June 59, 31p. 9 refs.

NYO-2666 $4.60

Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
GRAPHS FOR DETERMING REDUCED WIDTHS IN (d, p) STRIPPING EXPERIMENTS, by H. Y. Chen, H. A. Enge, and H. F. Lutz. Technical rept. no. 74 on Contract AT(30-1)-2098. Jan 62, 43p. 3 refs.

TID-15383 $1.60

Michigan U., Ann Arbor.
THE QUASI CLASSICAL TREATMENT OF NEUTRON SCATTERING, by R. Aamodt, K. M. Case and others. Rept. on Contract AT(11-1)-917. [1961] 11p. 8 refs.

FXM-633 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
COMPARISON OF THE CROSS SECTIONS OF BERYLLIUM WITH ITS IMPURITIES, by Claude Rotondo. 20 Jan 54, declassified 9 May 61, 2p.

TID-15040 $2.60

Yale U., New Haven, Conn.
THE ELASTIC AND INELASTIC SCATTERING OF C^{12} BY C^{12} AT 127 MEV, by K. H. Wang, S. D. Baker, and J. A. McIntyre. 14 Feb 62, 25p. 15 refs.

Radioactivity

HW-69692 $1.10

Hanford [Atomic Products] Operation, Richland, Wash.
THE RELEASE OF RADIOSTRONTIUM FROM STRONTIUM CARBONATE, by D. L. Reid, R. K. Hilliard, and L. F. Coleman. Rept. on Contract AT(45-1)-1350. 1 June 61, 10p.

NYO-9532 $5.60

Isotopes, Inc., Westwood, N. J.
STUDIES OF NUCLEAR DEBRIS IN PRECIPITATION, by Alan Walton, Edwin L. Fisher, and Philip W. Krey. Rept. on Contract AT(30-1)-2415. 31 May 62, 54p. 3 refs.

NASA N62-13756 $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
CURRENT ESTIMATES OF RADIATION DOSES IN SPACE, by Trutz Foelsche. July 62. 53p. 53 refs. NASA TN D-1267

PB 160 306 $1.10

Naval Medical Research Inst., Bethesda, Md.
THE CALIBRATION OF GAMMA EMITTING RADIOISOTOPES IN TERMS OF IONIZATION PRODUCED. I. A TECHNIQUE FOR CONTROLLED SCATTER CONDITIONS, by J. W. Duckworth. Vol. 12, p. 251-260 16 June 54, 10p. 4 refs. Research rept. on Project NM 006 012.04.71.

DESCRIPTORS: *Gamma emission, Scattering, Control, Calibration, *Radioactive isotopes, Cobalt, Rubidium, Iodine, Mercury, Radium, Gamma rays, Ionization, Sources.

The technique of calibrating gamma-emitting radioisotopes by comparison of ionization produced with that of a standard source such as radium is commonly employed. An important source of error in such a technique is found in the inability to account for the effect of scattered radiation. To make possible a correction to zero scatter effect, a technique of controlled scatter conditions has been developed and tested. Alternate measurements of ionization intensity with half or full scatter environment may be made, and the desired scatter correction factor may be calculated by orientating the source and detector symmetrically on the axis of a scatter tube constructed in two longitudinal sections. Corrected intensity versus source to distance values closely approached the inverse square relationship, thus providing a simple test for the validity of such a technique. (Author)

TID-14776 $1.60

Off-Site Radiological Safety Activities, Nevada Test Organization.
MONTHLY AIR, WATER, MILK, AND FILM BADGE REPORT, DECEMBER 1961, by Oliver R. Placak. 29 Jan 62, 19p.

TID-15708 $5.60

Vanderbilt U., Nashville, Tenn.
MEASUREMENTS OF IONIZATION PRODUCED BY 5 Mev ALPHA PARTICLES IN ARGON MIXTURES, by Charles E. Melton. Master's thesis. Feb 54, 58p. 10 refs.

Waste Disposal

NYO-4814 $7.60

Air Cleaning Lab., Harvard U., Boston, Mass.
EFFECT OF PULSATING AIR FLOW ON FIBER FILTER EFFICIENCY, by Harry S. Jordan and Leslie Silverman. Rept. on Contract AT(30-1)-841. 15 Dec 61, 55p. 29 refs.

TID-14871 $2.60

Duquesne Light Co., Shippingport, Pa.
RWD SYSTEM INCINERATOR TESTS. CORE I, SEED 3. 7 Feb 62, 24p. DLCS-3910101 and DLCS-3910201.

NYO-7831 $16.00

Johns Hopkins U., Baltimore, Md.
A STREAM SURVEY IN THE URANIUM MINING AND MILLING AREA OF THE COLORADO PLATEAU: COLORADO AND GUNNISON RIVERS, by James M. Morgan, Jr. Rept. on Contract AT(30-1)-1477. Dec 59, 202p. 57 refs.

ORNL-TM-169 $6.60

Oak Ridge National Lab., Tenn.
WASTE TREATMENT AND DISPOSAL, by R. E. Blanco and E. G. Struxness. Progress rept. Dec 61-Jan 62. 69p. 18 refs.

TID-15919 $3.60

Radiation Applications, Inc., Long Island City, N. Y.
FOAM SEPARATION, by H. M. Schoen, E. Rubin and others. Quarterly progress rept. no. 5, 1 Oct-31 Dec 61, on Subcontract 2024. 27 Feb 62, 36p.

PHYSICS

NASA N62-13669 $1.60

Armour Research Foundation, Chicago, Ill.
AFFECTS OF SOLAR PLASMA AND ELECTROMAGNETIC RADIATION ON THIN FILMS AND SURFACES, by L. C. Scholz and L. Reiffel. Quarterly rept. no. 3, 16 Sep-15 Dec 61, on Contract NASr-29. 5 Jan 62. 17p. 3 refs. Rept. ARF-1188-3.

TID-15484 $1.60

Columbia U., N. Y.
THE RESEARCH PROGRAM IN THEORETICAL PHYSICS AT THE PUPIN LABORATORY, by Robert Serber. Annual progress rept. on Contract AT(30-1)-1934. 30 Mar 62, 17p. 26 refs.

PB 181 347 $1.50

General Electric Co., Syracuse, N. Y.
THERMAL IMAGING TRANSDUCER, by H. Heil and W. J. Nolan. Rept. 1 Feb-19 Nov 59, on Research on the Quantum Nature of Light, Contract AF 33(616)6088 Apr 62, 54p. 27 refs. WADD Technical rept. 60-145; AD-238 055.

DESCRIPTORS: *Transducers, *Infrared radiation, Superconductors, Bolometers, Magnetic recording systems; Magnetic fields, Thin films, *Optical images, Design.

A search is made for an efficient transducer, sensitive to radiation in the 8 to 15 micron region of electromagnetic radiation. A transducer is considered in

which the sensing process utilizes the change brought about in the magnetic properties of a superconducting element by absorption of radiation. Two methods are suggested for reading the magnetic images: (1) a Schlieren optical reading method, and (2) a method of reading similar to the one used in magnetic recording. Experiments were limited to this last method. A magnetic reading head suitable for operation in vacuum and at liquid helium temperatures was designed. A drive mechanism, which would move the reading head in such an environment, and a mechanism which would permit synchronization of the oscillograph traces with the rotary motion of the head were built. The magnetic field of an iron core and its distortion by a superconducting shield, as well as the fringe field of a solenoid, and the fields trapped in a superconducting tin disk, were studied in detail.

NYO-9189 $2.60

Institute of Mathematical Sciences, New York U., N. Y.
LINEARIZED THREE COMPONENT MAGNETO HYDRODYNAMICS, by Richard L. Liboff. Rept. on Contract AT(30-1)-1480. 30 Apr 62, 24p. 11 refs. MF-29.

NASA N62-13088 $5.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
HOT WIRE CALORIMETER STUDY OF ION PRODUCTION AND ACCELERATION, by V. A. Sandborn and L. V. Baldwin. 1961, 57p. 16 refs.

TID-15642 $19.75

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
QUARTERLY PROGRESS REPORT, No. 65, on Contract AT(30-1)-1842. 15 Apr 62, 319p. 60 refs.

PB 160 759 $12.50

Technical Military Planning Operation, General Electric Co, Santa Barbara, Calif.
THREE-DIMENSIONAL RAY TRACE COMPUTER PROGRAM FOR ELECTROMAGNETIC WAVE PROPAGATION STUDIES, by Walter F. Dudziak. Rept. on Contract DA 49-146-XZ-038. 1 May 61, 175p. Rept. no. RM 61TMP-32; DASA 1232.

DESCRIPTORS: *Electromagnetic waves, *Propagation, Refractive index, *Digital computers, Computers, *Programming, Ionosphere, Earth, Magnetic fields, Geophysics.
A computer program is described for use on the IBM-704/7090 electronic data processing machine or any large computer accepting FORTRAN. The necessary modifications for use on these two computers are simple and self-evident. The computer program permits the computation of detailed ray patterns portraying the spatial distribution of rays emitted from a transmitter whose geographic coordinates with respect to the center of the earth are known. This program deals with the solution of the differential equations, given by Hamiltonian optics, for ray paths in non-isotropic, three-dimensionally nonhomogeneous media whose complex phase refractive index is given by the Appleton-Hartree formula. (Author)

AD-275 089 $3.60

Westinghouse Research Labs., Pittsburgh, Pa.
DRIFT VELOCITIES OF SLOW ELECTRONS IN KRYPTON, XENON, DEUTERIUM, CARBON MONOXIDE, CARBON DIOXIDE, WATER VAPOR, NITROUS OXIDE, AND AMMONIA, by J. L. Pack, R. E. Voshall, and A. V. Phelps. Technical rept. no. 11 on Proj. Defender, Contract Nonr-2584(00). 19 Mar 62, 31p. 24 refs. Scientific paper 62-908-113-P4; ARPA Order no. 125-61 (Amd. 4).

DESCRIPTORS: *Electrons, *Drift, Velocity, Measurement, *Gases, Krypton, Xenon, Deuterated compounds, Carbon compounds, Monoxides, Carbon dioxide, Water vapor, Nitrogen compounds, Oxides, Ammonia, Deuterium.

The drift velocities of electrons in krypton, xenon, deuterium, carbon monoxide, carbon dioxide, water vapor, nitrous oxide, and ammonia have been measured for E/p values between 2.5×10^{-4} and 30 volts/cm-mm Hg at temperatures between 77°K and 443°K. The data were obtained from measurements of electron transit times in a double-shutter drift tube. Values of the momentum transfer cross section as a function of electron energy for electrons with energies between about 0.003 and 0.08 ev are obtained which are consistent with the measured drift velocities for thermal electrons in all the gases reported. (Author)

Acoustics

NASA N62-13709 $2.60

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
EVALUATION OF THE SUBJECTIVE NOISINESS OF AIRCRAFT SOUNDS, by Karl D. Dryter and Karl S. Pearsons. Quarterly progress rept. no. 1, 17 July-17 Oct 61, on Contract NASr-58. 13p. 2 refs.

PB 181 361 $0.75

Navy Underwater Sound Reference Lab., Orlando, Fla.
HYDROPHONE CALIBRATOR, by Claude C. Sims. 12 Apr 62, 21p. USRL Research rept. no. 60.

DESCRIPTORS: *Hydrophones, *Calibration, Instrumentation

A system to provide rapid, reliable, economical calibration of small hydrophones is described. The system is designed for production testing and field use in the frequency range 100 cps to 3 kc. The hydrophone is placed in an open-ended column of water that is excited by an electrodynamic driver. Acoustic pressure in the tube is calculated from system parameters and compared to measured results for various types of hydrophones. Results agree with open-water data within ±1.0 db. (Author)

Electricity and Magnetism

ARF-1184-5 $3.60

Armour Research Foundation, Chicago, Ill.
MAGNETIC PROPERTIES OF INSULATORS, by Jordan J. Markham. Quarterly rept. no. 5, 15 Feb-15 May 62, on Contract AT(11-1)-578. 29 May 62, 32p. 14 refs.

NASA N62-13713 $1.10

Center for Radiophysics and Space Research, Cornell U., Ithaca, N. Y.
SPACE MAGNETOMETER DEVELOPMENT, by T. Gold. Quarterly status rept., 1 Dec-1 Mar 62, on NASA Contract NASr-46. 6 Mar 62. 4p. Rept. CRSR-112.

AD-277 380 repriced $1.50

General Electric Research Lab. [Schenectady, N. Y.]
RESEARCH ON SPONTANEOUS MAGNETIZATION IN SOLID BODIES, by I. S. Jacobs, D. S. Rodbell, and W. L. Roth. Final rept. 1 June 60-31 Oct 61, on Electronic and Magnetic Materials, Contract AF 33(616)7396. Feb 62, 52p. 83 refs. ASD Technical rept. 61-630.

DESCRIPTORS: *Magnetic materials, *Ferromagnetic materials, Crystals, *Antiferromagnetism, Solids, Powder metals, Cobalt, Radioactive isotopes, Nuclear resonance; Resonance, Magnetic fields, Neutron diffraction analysis, Manganese compounds, Fluorides, Lanthanum compounds, Manganese, Oxides, Yttrium, Iron, Garnet, Rare earth elements.

The nuclear magnetic resonance of Co^{59} in metallic cobalt powders has been examined. In addition to the absorption characteristic of Co^{59} in face-centered cubic cobalt, there were found an additional group of absorptions, one of which is clearly associated with hexagonal close packed cobalt. The phenomenon of spin-flopping in antiferromagnetic MnF_2, in which the axis of antiferromagnetism is decoupled from the crystal axes, was observed by magnetization measurements in high pulsed magnetic fields. The temperature dependence of the magnetocrystalline anisotropy of face-centered cubic cobalt metal was examined by ferromagnetic resonance on single crystal thin films and submicron precipitate particles in Cu, at temperatures below the range in which this is the stable structure. An investigation of magnetic exchange and structure in lanthanum manganite perovskite compounds spanning the transition between antiferromagnetism and ferromagnetism was performed using neutron diffraction and high field magnetization techniques. Evidence favored the single-phase canted spin model for this region over the model of a mixture of two crystallographically similar but magnetically distinct phases.

TID-15634 $4.60

Illinois U., Urbana.
MAGNETIC PROPERTIES OF He^3 AT LOW TEMPERATURES, by A. C. Anderson, W. Reese, and J. C. Wheatley. June 62, 50p. 25 refs.

NASA N62-12922 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A TECHNIQUE FOR THE PRODUCTION OF LARGE MAGNETIC FIELD USING SUPERCONDUCTORS, by Alvin F. Hildebrandt, Daniel D. Elleman and Frank C. Whitmore. 1962, 6p. 2 refs.

NASA N62-13877 $2.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
GEOMAGNETIC- AND INTERPLANETARY-MAGNETIC-FIELD ENVIRONMENT OF AN EARTH SATELLITE, by Edward W. Leyhe. July 62. 147p. 59 refs. Rept. NASA TN D-1019.

NASA N62-12487 $4.60

Rand Corp., Santa Monica, Calif.
A NOTE ON THE GENERATION OF THE MAIN-PHASE RING CURRENT OF A GEOMAGNETIC STORM, by J. W. Kern. Rept. on Contract NASr-21. May 62, 45p. 34 refs. Memo-RM-3137-NASA.

NASA N62-13833 $1.10

Rand Corp., Santa Monica, Calif.
SOLAR STREAM DISTORTION OF THE GEOMAGNETIC FIELD AS A MECHANISM FOR PRODUCING POLAR AURORAS AND ELECTROJETS, by J. W. Kern. Rept. on NASA Contract NAS5-276. Sep 61. 9p. 14 refs. Rept. RM-2834-NASA.

Molecular Physics and Spectroscopy

NASA N62-12486 $1.60

Bendix Corp., Southfield, Mich.
DEVELOPMENT OF COUNTING-RATE COMPUTER ELECTRONICS FOR A ROCKETBORNE SPECTROSCOPIC TELESCOPE, by R. H. Wagner. Progress rept. no. 2, 1 Mar-31 May, on Subcontract to Contract NASr-3. [1961] 17p. Rept. 1809.

NASA N62-12437 $1.10

Institute of Molecular Physics, U. of Maryland, College Park.
SEMIANNUAL STATUS REPORTS: NO. 5, APRIL 1961 TO OCT; NO. 6, OCT 1961 TO APRIL 1962, by E. A. Mason and J. T. Vanderslice. Rept. on Grant NsG-5-59. 1962, 5p. 7 refs.

AD-252 565 $19.75

King's Coll., U. of London (Gt. Brit.)
MOLECULAR AND SOLID STATE SPECTROSCOPY, 1959-1960, by W. C. Price and G. R. Wilkinson. Final technical rept. no. 2, 1 Nov 59-31 Oct 60, on Contract DA 91-591-EUC-1308. Dec 60, 332p. 178 refs.

DESCRIPTORS: *Spectrographic analysis, Infrared spectroscopy, Ultraviolet spectroscopy, Instrumentation, Vibration, Absorption, Reflection, *Solid state physics. *Crystals, Paramagnetic resonance, Ionization potentials, Alkali metal compounds, Halides, Potassium compounds, Magnesium compounds, Oxides, Hydroxides, Quartz, Calcite, Sapphires, Toluenes, Fluorine, High pressure research

Contents:
The vibrational spectrum of U centres in alkali halides
High pressure studies on the vibrational spectrum of

polyatomic ions isolated in alkali halides
The infra-red absorption and reflection spectra of alkali halides and their optical constants n and k
The infra-red and ultraviolet absorption and reflection spectra of magnesium oxide (MgO) and its optical constants n and k
Infra-red, ultraviolet and electron paramagnetic resonance studies on:- (a) quartz (SiO_2), (b) calcite ($CaCO_3$), (c) sapphire (Al_2O_3)
The effect of temperature on the infra-red spectrum of crystals of: (a) hexamethyl benzene $C_{12}H_{18}$ (b) brucite $Mg(OH)_2$ (c) zeise's salt $K^+[PtCl_3C_2H_4]^- H_2O$
Far infra-red instrumentation
The absorption and reflection spectra of some crystalline materials in the ultraviolet (40,000-100,000 cm^{-1}; 2,500-10,000A)
The spectra and ionization potentials of some radicals and molecules
The effect of fluorine on the electronic spectra and ionization potentials of molecules

TID-15705 $4.60

Vanderbilt U., Nashville, Tenn.
THE INFRARED SPECTRA OF THIONYL CHLORIDE AND SULFURYL CHLORIDE, by Dowell Edward Martz. Master's thesis. 8 Aug 53, 45p. 15 refs.

TID-15828 $2.60

W. M. Keck Lab., of Engineering Materials, Inst. of Tech., Pasadena.
CHARACTERISTIC MODIFIED X-RAY SCATTERING, by K. Das Gupta. Technical rept. no. 5 on Contract AT(04-3)-221. May 62, 26p. 5 refs.

Solid State Physics

AD-277 018 repriced $1.25

Politecnico di Milano (Italy).
RESEARCH ON HYDROGEN OVERVOLTAGE ON METALLIC SINGLE CRYSTAL, by R. Piontelli, L. Peraldo Bicelli, and A. La Vecchia. Rept. 1 July 60-30 June 61, on Surface and Interface Phenomena of Matter, Contract AF 61(052)144. Mar 62, 42p. 29 refs. ASD-TN-61-158.

DESCRIPTORS: *Electrochemistry, *Hydrogen, Voltage, *Zinc, *Bismuth, *Antimony, Crystals, *Single crystals, *Metallic crystals

Hydrogen overvoltage on zinc, bismuth, and antimony single crystals has been measured in different experimental conditions. Tafel law is generally followed. Comparisons are made with the results previously obtained on other single crystal electrodes. (Author)

AD-276 870 repriced $0.75

Politecnico di Milano (Italy).
RESEARCHES ON THE INFLUENCE OF SOME MINOR CONSTITUENTS OF THE SOLUTION ON HYDROGEN OVERVOLTAGE OF Cu SINGLE CRYSTALS, by B. Rivolta and A. Pappagallo. Rept. 1 Jan-1 Mar 61, on Characterization of Solid Phase and Interface Phenomena in Crystalline Substances, Contract AF 61(052)144. Mar 62, 22p. 13 refs. ASD-TDR-62-229.

DESCRIPTORS: *Electrochemistry, *Hydrogen, Voltage, *Copper, Crystals, *Single crystals, Cadmium, Arsenic, Antimony, Indium, *Metallic crystals.

The influence of 10^{-5} M/l of Cd, 10^{-4} M/l of As, Sb, and In in 0.1 M sulfuric acid on the hydrogen overvoltage of Cu polycrystalline and single crystal cathodes, oriented following the (111), (110), and (100) planes, has been investigated. In the c. d. range studied, due to the presence of Cd and In, the Tafel line is broken into two branches, shifted one from the other, having almost the same b value. In the presence of Sb, or As, the overvoltage vs log c. d. plot is still linear, but for As the slope value is lower. (Author)

TID-14291 $7.60

Poulter Labs., Stanford Research Inst., Menlo Park, Calif.
SHOCK WAVE COMPRESSION OF QUARTZ, by G. R. Fowles. Technical rept. 003-61. 26 Oct 61, 76p. 37 refs.

TID-15816 $1.10

W. M. Keck Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
DENDRITIC CRYSTALLIZATION OF AN AMORPHOUS ALLOY, by R. H. Willens. Technical rept. no. 4 on Contract AT(04-3)-221. Apr 62, 8p. 4 refs.

PB 181 362 $0.50

Watertown Arsenal Labs., Mass.
ORIENTED SINGLE CRYSTALS OF ALUMINUM FOR X-RAY ANALYSIS, by Joseph M. Dhosi, Charles P. Gazzara, and Raymond M. Middleton. June 62, 10p. 4 refs. Technical rept. WAL TR 129.1/1.

DESCRIPTORS: *X-ray diffraction analysis, Crystal structure, *Single crystals, Metallic crystals, *Aluminum

A simple gradient heating apparatus was developed and used successfully in growing oriented single crystals of high-purity aluminum suitable for X-ray diffraction analysis. (Author)

Thermodynamics

NASA N62-13144 $2.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
THE APPARENT TEMPERATURE OF ISOLATED OBJECTS, by William H. Peake. Rept. on NASA Grant NsG-213-61; Contract AF 33(616)6158. 1 Oct 61. 25p. 8 refs. Rept. 1388-2.

DC-59-10-202 $2.60

General Electric Co., Cincinnati, Ohio.
FABRICATION OF CHROMEL A VERSUS 875 ALLOY THERMOCOUPLES, by J. W. Glasgow. Preliminary rept. on Contract AT(11-1)-171. 13 Nov 59, 18p.

NASA N62-13750 $1.10

Heat Transfer Lab., U. of Minn., Minneapolis.
RADIATION HEAT TRANSFER, by E. M. Sparrow. Semiannual status rept., 1 Apr-1 Oct 61, on NASA Grant NsG-137-61. 1961, 4p.

NASA N62-12546 $2.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
MAGNETICALLY DIFFUSED RADIAL ELECTRIC-ARC HEATER EMPLOYING WATER-COOLED COPPER ELECTRODES, by Robert F. Mayo and Don D. Davis, Jr. 1962, 22p. 2 refs.

NASA N62-12551 $2.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ON THE INITIATION OF COOLING DUE TO BUBBLE GROWTH ON A HEATING SURFACE, by Robert C. Hendricks and Robert R. Sharp. 1961, 28p. 7 refs.

PB 160 733-1 $1.60

National Bureau of Standards [Washington, D. C.]
THE THERMAL DIFFUSIVITY OF IRON. PART I. A GENERATOR FOR PRODUCING SINUSOIDAL TEMPERATURES, by Howard W. Flieger, Jr. and Defoe C. Ginnings. Rept. for 1 Jan 57-31 July 58, on ICBM Materials, Contract AF 33(616)57-6. Dec 59, 15p. WADC Technical rept. 59-276, Part I; AD-234 615.

DESCRIPTORS: *Thermal diffusion, Heat transfer, Metals, *Iron, Electric currents, Heaters, Heat production, Laboratory equipment.

There is described a generator for producing sinusoidal temperatures in an apparatus for measuring thermal diffusivities. Using sine potentiometers, sinusoidal temperature waves have been obtained with distortions comparable with the inaccuracies of the sine potentiometers. The system using pulse time modulation has the advantages that (1), a simple relay is used to turn on and off a fixed current to give a sinusoidal power variation in an electric heater, (2), an additional fixed power can be added to the sinusoidal power without producing distortion, and (3), the generator can be used easily with servo-control either to improve wave form or to introduce known distortion. (Author)

NASA N62-13142 $17.00

Stanford U., Calif.
HEAT TRANSFER WITH LAMINAR AND TURBULENT FLOW BETWEEN PARALLEL PLANES WITH CONSTANT AND VARIABLE WALL TEMPERATURE AND HEAT FLUX, by P. A. McCuen, W. M. Kays, and W. C. Reynolds. Rept. on Grant NsG-52-60. 12 Apr 62, 270p. 65 refs. Report. AHT-3.

NASA N62-13143 $16.00

Stanford U., Calif.
HEAT TRANSFER WITH TURBULENT FLOW IN CONCENTRIC AND ECCENTRIC ANNULI WITH CONSTANT AND VARIABLE HEAT FLUX, by E. Y. Leung, W. M. Kays, and W. C. Reynolds. Rept. on NASA Grant NsG-52-60. 15 Apr 62, 241p. 63 refs. Report AHT-4.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB 181 358 $2.75

Office of Naval Research, Washington, D. C.
WEAPONS AND WEAPONS EFFECTS. THE SIXTH NAVY SCIENCE SYMPOSIUM SPONSORED BY THE OFFICE OF NAVAL RESEARCH, May 2-3, 1962, U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY, SAN FRANCISCO, CALIFORNIA. [1962] 133p. 31 refs. Rept. no. ONR-12, vol. 1.

DESCRIPTORS: *Naval research, *Military research, *Scientific research, *Symposia, *Weapons, *Nuclear weapons, *Atmosphere, Radioactivity, Fission products, *Underground structures, Blast, Military psychology, *Chemical warfare, Decontamination, Wind, Water, *Nuclear explosions, Very low frequency, Detection, Ionization, *Radiobiology, Radiation hazards, Radiation damage, *Radiation injuries, Recovery, *Thermal radiation, Burns, Exposure.

Contents:
Presentation of the Captain Robert Dexter conrad award
The Navy laboratories and the fleet of the future
Atmospheric radioactivity
Behavior of buried arches under blast loading
Psychological aspects of weapons and weaponry
Chemical warfare decontamination by wind and water
VLF detection of nuclear detonations in space
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